

GOVERNMENT OF THE  
GOLD COAST.

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REPORT

ON THE

Medical and Sanitary  
Department

FOR THE YEAR

APRIL, 1927 to MARCH, 1928.











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21246



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# Report on the Medical and Sanitary Department for the year 1927-28.

## I. ADMINISTRATION—MEDICAL AND SANITATION.

### (a) STAFF—EUROPEAN—MEDICAL.

#### *Appointments, Transfers, Promotions, etc.*

Dr. W. J. D. Inness, late Director of Medical and Sanitary Services, Sierra Leone, was appointed on transfer from Sierra Leone to be Director of Medical and Sanitary Service, Gold Coast, (*vice* Dr. M. E. O'Dea, retired on pension on the 18th March, 1927,) and assumed duty on the 26th October, 1927.

#### *Promotions.*

Dr. J. M. O'Brien, M.B.E., was promoted Medical Specialist on the 29th October, 1927.

Dr. D. Duff was promoted Assistant Director of Medical Service on the 28th January, 1928.

Dr. E. F. Ward was promoted Senior Medical Officer on the 7th July, 1927.

Dr. S. L. Brothier was promoted Senior Medical Officer on the 19th October, 1927.

Dr. R. Mugliston was promoted Senior Medical Officer on the 18th March, 1927.

#### *Appointments.*

Drs. J. F. Southward, A. M. Gillespie, G. M. Minifie, H. G. Maguire, E. L. Sanders, M. Jackson, A. MacPherson, A. Walker, W. Magowan were appointed as Medical Officers during the year.

Dr. G. M. L. Summerhayes, was appointed as Woman Medical Officer on the 21st March, 1928, and had not assumed duty at the end of the year under review.

Mr. J. Campbell was appointed as Dental Surgeon and assumed duty on the 17th November, 1927.

Mr. G. McLardie was appointed as Radiographer and assumed duty on the 15th February, 1928.

Mr. W. Dunlin was appointed as Dispensers' Instructor and assumed duty on the 14th March, 1928.

Mr. L. C. Whitcombe was appointed Secretary, Gold Coast Hospital, and assumed duty on the 27th April, 1927.

Mr. R. W. Clarke, formerly Government Analyst in Cyprus, was appointed Analytical Chemist on the 17th August, 1927, and assumed duty on the 31st August, 1927.

Miss E. M. Stringer, Miss M. J. Shannon, Miss S. M. E. Edwards, Miss B. M. Head, Miss M. Beesley and Miss L. Morgan were appointed as Nursing Sisters on the 13th April, 1927, 13th April, 1927, 17th August, 1927, 31st August, 1927, 31st August, 1927 and 6th October, 1927, respectively.

#### *Other Changes in the Staff during the year:—*

Dr. E. W. Wood-Mason, Assistant Director of Medical Service, retired on pension on the 28th January, 1928.

Dr. C. V. Le Fanu, Medical Specialist, retired on pension on the 29th October, 1927.

Dr. J. M. O'Brien, Medical Specialist, died on the 26th March, 1928.



Dr. A. Heron, Medical Officer, had his appointment terminated on the 26th August, 1927.

Dr. E. J. Daly, Medical Officer, transferred to the Sanitation Branch on the 21st October, 1927.

Dr. J. Hamilton, Medical Officer, transferred to the Sanitation Branch on the 30th June, 1927.

Dr. R. D. Reid, Medical Officer, transferred to the Sanitation Branch on the 31st August, 1927.

Dr. A. B. Monks, Medical Officer, transferred to the Sanitation Branch on the 1st September, 1927.

Dr. G. M. Minifie, Medical Officer, transferred to the Sanitation Branch on the 7th May, 1927.

Mr. F. G. Ashby, Office Assistant and Accountant, died on the 5th March, 1928.

Dr. D. H. Brayne, Radiographer, had his appointment terminated on the 29th September, 1927.

Sergeant C. J. Price, R.A.M.C., Dispensers' Instructor, was restored to his Unit on the 30th December, 1927.

Miss F. Gilbey, Nursing Sister, resigned as from the 24th February, 1928.

Miss G. A. Donegan, Nursing Sister, proceeded on leave on the 24th April, 1927, and did not return.

#### STAFF—AFRICAN—MEDICAL.

##### *Promotions.*

Mr. R. D. H. Obilie, 2nd Division Dispenser, was promoted 1st Division Dispenser on the 6th November, 1927.

Mr. S. Labbi, 2nd Division Nurse, was promoted 1st Division Nurse on the 1st April, 1927.

##### *Appointments.*

Dr. F. Ribeiro was appointed as Junior African Medical Officer on the 22nd May, 1927.

##### *Other Changes in the Staff during the year:—*

Mr. F. W. Thompson, 1st Division Dispenser, retired on pension on the 6th November, 1927.

Mr. J. B. Lomotey, 1st Division Dispenser, died on the 27th February, 1928.

Mr. H. O. Quartey, 2nd Division Dispenser, was dismissed on the 16th September, 1927.

Mr. W. A. Hanson, 2nd Division Dispenser, was dismissed on the 20th February, 1928.

#### STAFF—EUROPEAN—SANITATION.

Dr. H. O'Hara May, Deputy Director of Sanitary Service, late Deputy Director of Sanitary Service, Sierra Leone, was promoted Deputy Director of Sanitary Service, Gold Coast on the 17th June, 1927, and assumed duty on the 24th of August, 1927.

Dr. W. G. Watt, Assistant Director of Sanitary Service, acted as Deputy Director of Sanitary Service from the 1st of April to the 7th of May, 1927, when he proceeded on leave. He resumed duty on the 17th November, 1927. He was promoted from the rank of Senior Sanitary Officer to that of Assistant Director of Sanitary Service on the 16th March, 1928.

Dr. P. S. Selwyn-Clarke, M.C., Senior Sanitary Officer, acted as Deputy Director of Sanitary Service from the 7th of May to the 23rd of August, 1927.

Dr. M. B. Hay, Senior Sanitary Officer, was on leave at the beginning of the year and was invalided out of the service as from the 12th of September, 1927. His vacancy was unfilled on the 31st March, 1927.

Dr. J. A. A. Duncan, M.C., Medical Officer of Health, proceeded on leave on the 7th of May, 1927. Whilst on leave he was promoted on the 12th September, 1927, to the post of Senior Sanitary Officer and left on transfer to Nigeria on the 26th of October, 1927.

Dr. W. H. Howells, Medical Officer of Health, resumed duty on the 21st of June, 1927, and acted as Senior Sanitary Officer and Medical Officer of Health from the 29th of June until the 17th of November, 1927, and on occasions throughout the year.

Dr. D. Lennox, Medical Officer of Health, proceeded on leave of absence on the 30th of July, 1927.

Dr. H. C. E. Quin, Medical Officer of Health, was on duty throughout the year.

Dr. W. D. Whamond, Medical Officer of Health, was appointed on the 12th of October, 1927, and assumed duty on the 26th of October, 1927.

Dr. E. J. Clark, M.C., Medical Officer of Health, was appointed on the 29th of February, and assumed duty on the 13th of March, 1928.

Dr. V. E. Whitman, Medical Officer of Health, was appointed on the 14th of March, and assumed duty on the 28th of March, 1928.

All of the seven vacancies that existed on the 1st of April, 1927, and that occasioned by the promotion of Dr. Duncan were filled and, on the 31st of March, 1928, the department was actually two over the number provided for in the Estimates for 1927-28.

Dr. N. A. Vane-Percy, Woman Medical Officer, assumed duty on the 27th of April, 1927.

Dr. A. M. K. O'Halloran, Woman Medical Officer, was on duty until the 18th of March, 1928, when she proceeded on leave.

Dr. M. C. Chappel, Woman Medical Officer, resumed duty on the 10th of May, 1927.

Dr. A. M. A. Downing, Woman Medical Officer, was on duty until the 11th of February, 1928, when she proceeded on leave.

Two additional appointments in this grade were approved by the Secretary of State during the year but the posts were not filled at the end of the year.

During the period under review twelve Superintending Sanitary Inspectors were on duty except for periods of leave or sickness.

#### STAFF—AFRICAN—SANITATION.

The following additions to the African Staff were made during the year :—  
Six 2nd Division Clerks, twenty-seven Sanitary Inspectors-in-Training, five Village Overseers, one Nurse-in-Training.

The following officers resigned :—

Messrs J. C. Allotey and M. G. Kofi, 2nd Division Sanitary Inspectors ; Messrs. M. O. Akuamuah, C. O. Amegatcher, R. O. Anim, E. N. Anipare, O. K. Okwaning, L. W. Sackey, Sanitary Inspectors-in-Training ; Miss C. M. Quartey, Nurse-in-Training ; Mrs. Johnson, Attendant, Contagious Diseases Hospital.

The following had their appointments terminated :—

Mr. N. Lartey, 2nd Division Sanitary Inspector and Miss Kate Wood, Attendant, Contagious Diseases Hospital.

The following were dismissed the Service :—

Mr. F. A. Bruce, 2nd Division Sanitary Inspector ; Mr. S. A. Cleland, 2nd Division Clerk.

Mr. G. Tedeku, Sanitary Inspector-in-Training was invalided out of the Service.



## (b) ORDINANCES.

The main Ordinances affecting public health which were passed during the year under review were the following :—

- (a) The Towns Amendment Ordinance, No. 28 of 1927, where power is given to regulate streets and buildings by means of by-laws made under a section thereof.
- (b) The Kumasi Public Health Board Amendment Ordinance, No. 5 of 1927, where similar powers are given to the Kumasi Public Health Board.
- (c) The Towns Amendment Ordinance, No. 13 of 1928, where authority is given to regulate and restrict hawkers both as regards their wares and where they may ply their trade. Another section strengthens the hands of the sanitary authorities in dealing with animals kept on premises so as to cause a nuisance.
- (d) The Town Councils Law Amendment Ordinance, No. 10 of 1928, where the Governor in Council may include a village or land adjacent to a town in the town boundary thereby causing the various sanitary laws to apply automatically to the place in question.
- (e) Various villages were brought under the Towns Ordinance by Orders in Council made under the Towns Ordinance.
- (f) Various Orders by the Governor under the Quarantine and Infectious Diseases Ordinances declaring certain localities infected owing to outbreaks of infectious diseases were made and revoked during the year.

## (c) FINANCE.

Estimated Expenditure for the year 1927-28.

(a) *Personal Emoluments.*

## MEDICAL.

	£	s.	d.
Administrative Officers .. .. .	6,720	0	0
Specialists .. .. .	4,575	0	0
Senior Medical Officers .. .. .	7,350	0	0
Medical Officers (European and African) .. .. .	38,074	0	0
Dental Surgeons .. .. .	1,566	0	0
European Nursing Staff .. .. .	8,483	0	0
African Nursing Staff and Dispensers .. .. .	23,183	0	0
Clerical Staff .. .. .	3,167	0	0
Various items, allowances, etc. .. .. .	14,421	0	0
Estimated Total Personal Emoluments .. .. .	107,539	0	0
Actual Total Personal Emoluments .. .. .	98,553	15	6

## SANITATION.

	£	s.	d.
Administrative Officers .. .. .	1,560	0	0
Senior Sanitary Officers and Medical Officers of Health .. .. .	13,904	0	0
European Sanitary Inspectors .. .. .	5,337	0	0
African Sanitary Inspectors .. .. .	13,496	0	0
Various items, allowances, etc. .. .. .	8,796	0	0
Estimated Total Personal Emoluments .. .. .	43,093	0	0
Actual Total Personal Emoluments .. .. .	37,422	13	9

## MEDICAL RESEARCH INSTITUTE.

	£	s.	d.
European Staff .. .. .	9,160	0	0
African Staff .. .. .	1,042	0	0
Estimated Total Personal Emoluments .. .. .	10,202	0	0
Actual Total Personal Emoluments .. .. .	8,880	3	5

## (b) Other Charges.

## MEDICAL.

						£	s.	d.
Passages, Transport, etc.	..	..	..	..	..	16,976	0	0
Hospital Equipment, Drugs, Medical Appliances, Surgical Instruments, etc.	..	..	..	..	..	24,400	0	0
Diets, Medical Comforts	..	..	..	..	..	9,900	0	0
Other items	..	..	..	..	..	4,450	0	0
Contributions	..	..	..	..	..	820	0	0
Estimated Total	..	..	..	..	..	56,546	0	0
Actual Expenditure	..	..	..	..	..	67,065	19	6

## SANITATION.

						£	s.	d.
Passages, Transport, etc.	..	..	..	..	..	9,242	0	0
General Sanitary Votes	..	..	..	..	..	17,912	0	0
Scavengers and Labourers	..	..	..	..	..	30,702	0	0
Estimated Total	..	..	..	..	..	57,856	0	0
Actual Expenditure	..	..	..	..	..	55,970	6	6

## MEDICAL RESEARCH INSTITUTE.

						£	s.	d.
Passages, Transport, etc.,	..	..	..	..	..	2,609	0	0
General Research Votes	..	..	..	..	..	1,955	0	0
Estimated Total	..	..	..	..	..	4,564	0	0
Actual Expenditure	..	..	..	..	..	3,490	14	9
Estimated total expenditure, Medical Departments	..	..	..	..	..	£279,800	0	0
Actual total expenditure, Medical Departments	..	..	..	..	..	£261,383	13	11
Revenue earned by Medical Department :—								
(a) Hospital Fees	..	..	..	..	..	£6,912	18	2
(b) Sale of Drugs in private practice	..	..	..	..	..	£658	2	8
Total	..	..	..	..	..	£7,571	0	10

RATIO OF MEDICAL EXPENDITURE TO THE TOTAL EXPENDITURE  
FOR THE COLONY, 1927-28.

						£	s.	d.
Total Expenditure for the Colony (excluding Extraordinary or Special Expenditure)	..	..	..	..	..	2,374,087	0	0
Total Expenditure Medical Services (Medical, Sanitation, Research)	..	..	..	..	..	261,384	0	0

[This figure is exclusive of the cost of buildings, e.g. Hospitals, Dispensaries etc., and other Public Health Works, such as Water Supplies, Town Improvements, etc.]

The ratio of total Expenditure on Medical Services to the total Expenditure for the Colony was therefore 11 per cent.



II.—PUBLIC HEALTH.

(a) GENERAL REMARKS.

The following Table shews the most noteworthy contrasts in the Returns of Diseases treated by the Medical Branch during the years 1925-26, 1926-27 and the period under review :—

Diseases.	1925-26.	1926-27.	1927-28.
Small-pox .. .. .	1,948	172	5
Varicella (Chicken-pox) .. .. .	241	165	171
Dysentery .. .. .	936	—	—
(a) Amoebic .. .. .	—	515	550
(b) Bacillary .. .. .	—	145	130
(c) Undefined or due to other causes .. .. .	—	180	328
Enteric Group :—	—	—	—
(a) Typhoid Fever .. .. .	—	16	19
(b) Para-typhoid A .. .. .	—	15	2
(c) Para-typhoid B .. .. .	—	—	7
(d) Type not defined .. .. .	8	53	2
Influenza .. .. .	548	220	452
Malaria .. .. .	—	—	—
(a) Tertian .. .. .	886	1,301	2,706
(b) Quartan .. .. .	382	91	14
(c) Aestivo-autumnal .. .. .	2,742	2,675	3,102
(d) Cachexia .. .. .	657	675	704
(e) Blackwater .. .. .	18	7	16
(f) Unclassified .. .. .	1,893	1,687	2,429
Measles .. .. .	32	44	53
Pneumonia :— .. .. .	687	—	—
(a) Broncho-Pneumonia .. .. .	—	257	209
(b) Lobar Pneumonia .. .. .	—	447	614
(c) Unclassified .. .. .	—	84	153
Trypanosomiasis (Sleeping Sickness) .. .. .	37	67	59
Whooping Cough .. .. .	107	102	116
Alcoholism .. .. .	55	37	19
Yellow Fever .. .. .	8	86	45
Tuberculosis .. .. .	571	—	—
(a) Pulmonary and Laryngeal .. .. .	—	515	682
(b) Other forms .. .. .	—	183	228
Plague :—	—	—	—
(a) Bubonic .. .. .	—	—	—
(b) Pneumonic .. .. .	—	—	—
(c) Septicæmic .. .. .	—	—	—
(d) Undefined .. .. .	2	—	—

COMPARATIVE FIGURES FOR THREE YEARS 1925-26, 1926-27, 1927-28 FOR ALL PATIENTS TREATED IN HOSPITALS AND DISPENSARIES.

Year.	Remaining in Hospital.	Total cases treated (in and out-patients).	Deaths.	Remaining in Hospital.	Percentage of Deaths to total patients treated.
1925-26 ..	467	97,910	862	489	.88
1926-27 ..	489	105,300	700	626	.66
1927-28 ..	620	133,069	980	601	.74

The health of the European community may, on the whole, be considered not unsatisfactory. One matter which gave cause for anxiety was the continuance of the yellow fever outbreak which began in the previous year, and from which the non-official element suffered most.

Subjoined are tables for officials and non-officials which show over a number of years the percentage of invalidings and deaths as compared with the numbers resident, from which it will be seen that the percentages both for officials and non-officials have not been more than average.

TABLE SHOWING INVALIDING AND DEATH-RATES OF EUROPEAN OFFICIALS SINCE 1915 BASED ON THE AVERAGE NUMBER RESIDENT.

Year.	Average No. Resident.	Total Invalided.	Percentage Invalided.	Total died.	Percentage died.
1915 ..	631	21	3.33	7	1.10
1916 ..	468	24	5.13	4	.85
1917 ..	489	19	3.88	9	1.84
1918 ..	413	54	13.07	6	1.45
1919 ..	522	28	5.36	6	1.15
1920 ..	620	30	4.83	7	1.13
1921 ..	612	38	6.20	14	2.28
April, 1922— March 1923	719	30	4.17	6	.83
1923-24 ..	689	32	4.65	10	1.45
1924-25 ..	680	58	8.52	7	1.02
1925-26 ..	761	59	7.75	8	1.05
1926-27 ..	783	49	6.26	3	.38
1927-28 ..	835	39	4.67	6	.71

REMARKS ON ABOVE TABLE.

The high invaliding-rate in 1918 was due to the Influenza outbreak.

In 1921 the death-rate appears high, but the majority of the deaths were due to non-tropical ailments. Five out of fourteen only could be assigned to purely tropical diseases.

Similarly in 1923-24 only four out of the 10 could be assigned to tropical diseases.

In 1924-25 one death was due to Dysentery and three (one doubtful) to Yellow fever. The other three were non-tropical.

In 1927-28 only one (Blackwater fever) out of the six could be called tropical.

In order to compare the health of European Officials with that of Non-officials, two Tables are given below :—

EUROPEAN OFFICIALS—PERCENTAGE OF INVALIDINGS AND DEATHS TO TOTAL NUMBER RESIDENT.

Year.	Total number Resident.	Invaliding Percentage.	Deaths Percentage.
1915 .. .. .	700	3.00	1.00
1916 .. .. .	589	4.07	.67
1917 .. .. .	597	3.18	1.50
1918 .. .. .	515	10.48	1.16
1919 .. .. .	653	4.29	.92
1920 .. .. .	775	3.87	.90
1921 .. .. .	768	4.94	1.82
1922-23 .. .. .	979	3.06	.61
1923-24 .. .. .	994	3.21	1.00
1924-25 .. .. .	846	6.85	.82
1925-26 .. .. .	994	5.93	.80
1926-27 .. .. .	1,046	4.68	.28
1927-28 .. .. .	1,202	3.24	.49



EUROPEAN NON-OFFICIALS.—PERCENTAGE OF INVALIDINGS AND DEATHS TO  
TOTAL RESIDENTS.

Year.	Total number resident.	Invaliding Percentage.	Deaths Percentage.
1915 .. ..	1,306	3.21	.99
1916 .. ..	1,422	5.69	.70
1917 .. ..	1,575	6.03	1.14
1918 .. ..	1,308	3.59	3.82
1919 .. ..	2,529	1.82	.87
1920 .. ..	2,043	3.23	1.22
1921 .. ..	2,171	2.44	.82
1922-23 .. ..	2,019	2.27	1.23
1923-24 .. ..	2,049	2.68	.68
1924-25 .. ..	2,020	3.26	.59
1925-26 .. ..	2,110	3.12	.66
1926-27 .. ..	2,435	2.66	.94
1927-28 .. ..	2,375	2.02	.88

Malaria was, as in previous years, the most frequent individual cause of illness. The following Table shows the relative position of Malaria as a cause of time lost through sickness by European Officials during the year :—

Year.	Average No. Resident.	Total Sick days.	Total days on Sick List for Malaria.	Total days on Sick List for Other Diseases.	Percent- age of days lost through Malaria to total days lost.	No. of days lost through Malaria for the year per 100 Residents.
1923-24 ..	689	6,115	1,565	4,550	25.59	227
1924-25 ..	680	8,614	1,746	6,868	20.26	256
1925-26 ..	761	6,108	1,547	4,561	25.32	203
1926-27 ..	783	6,847	1,204	5,643	17.58	153
1927-28 ..	835	7,023	1,530	5,493	21.81	183

AFRICAN OFFICIALS.

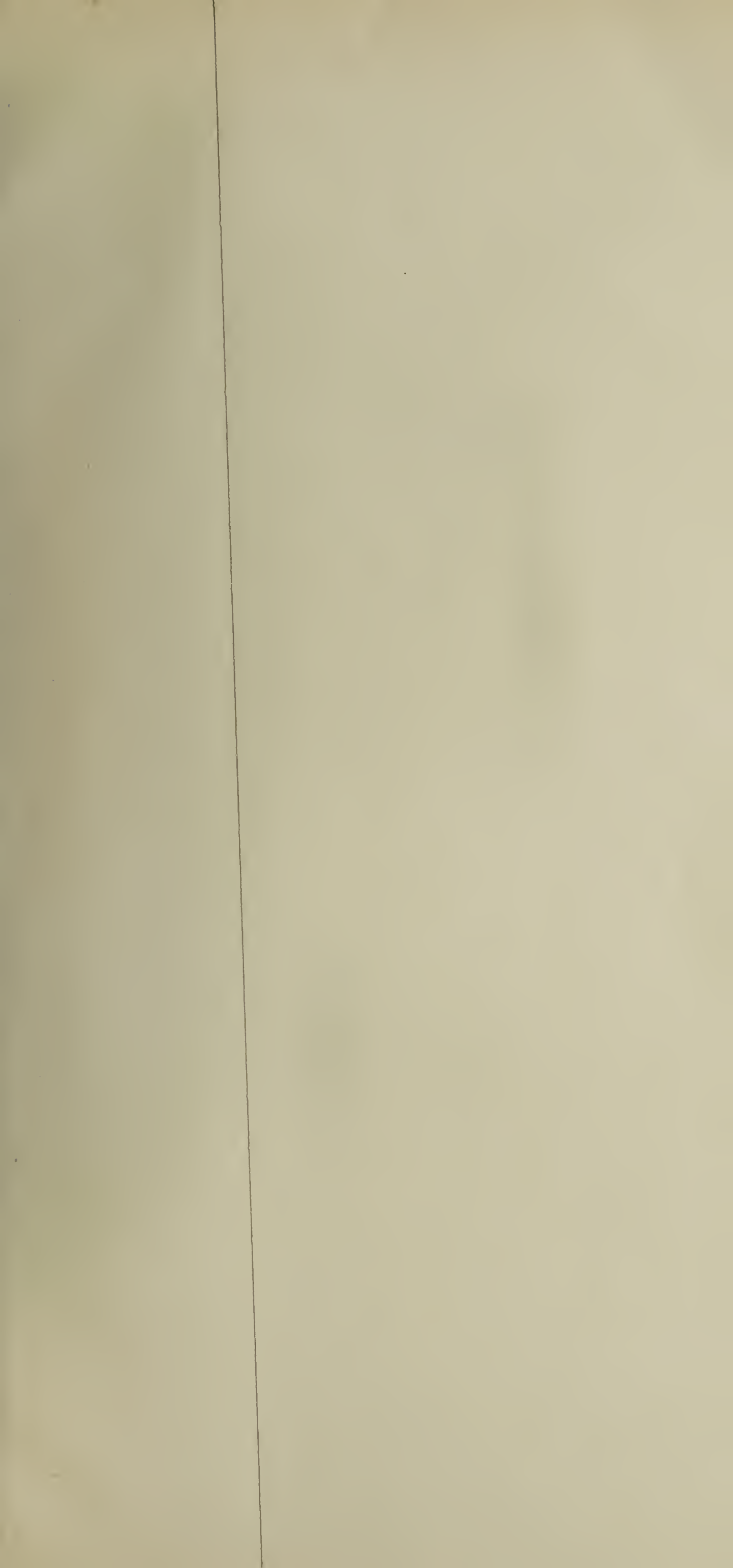
The general health of African officials was good, an inspection of the table given below under " Vital Statistics " shows a gratifying decline in the sickness figures for the previous two years.

GENERAL AFRICAN COMMUNITY.

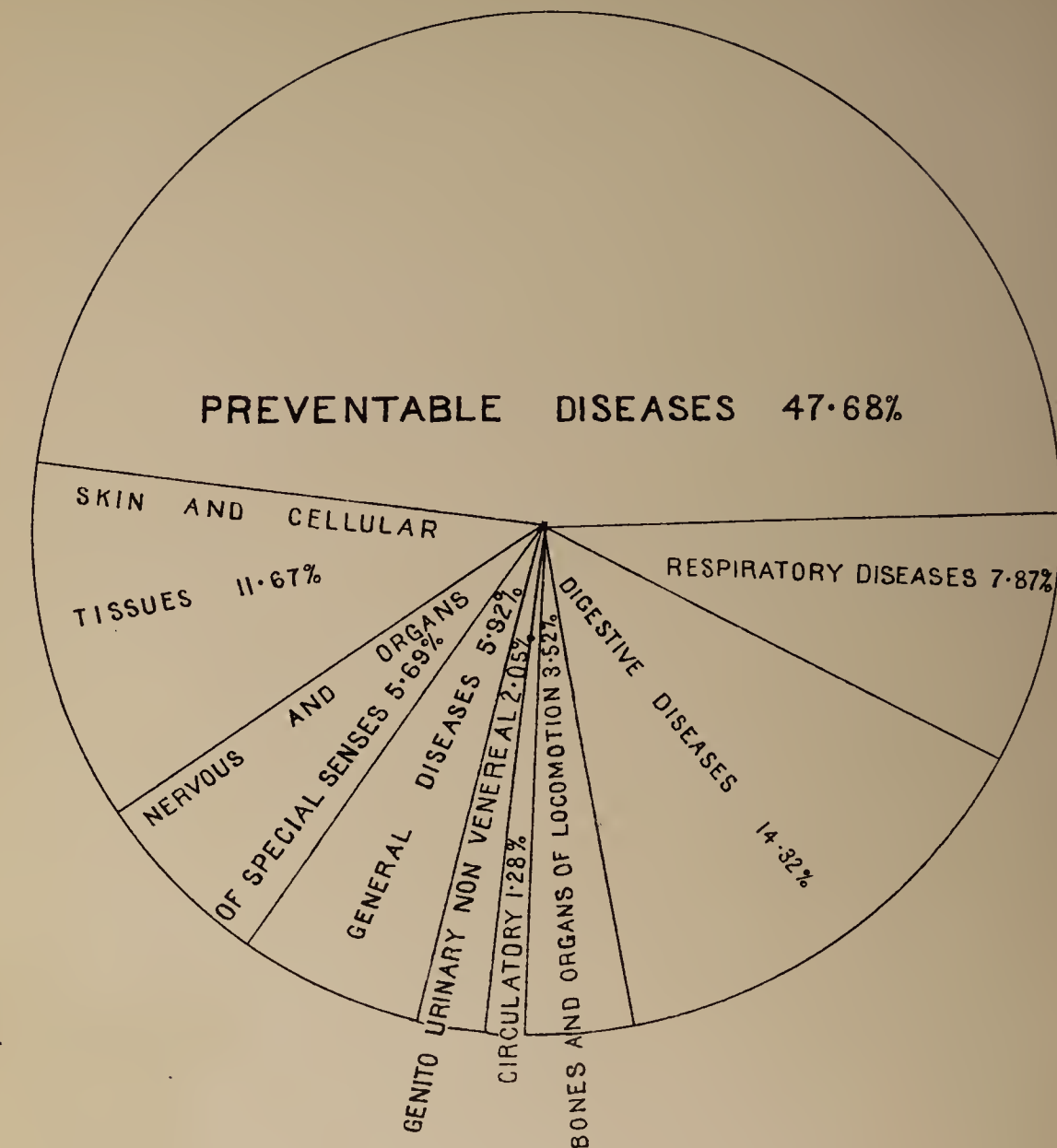
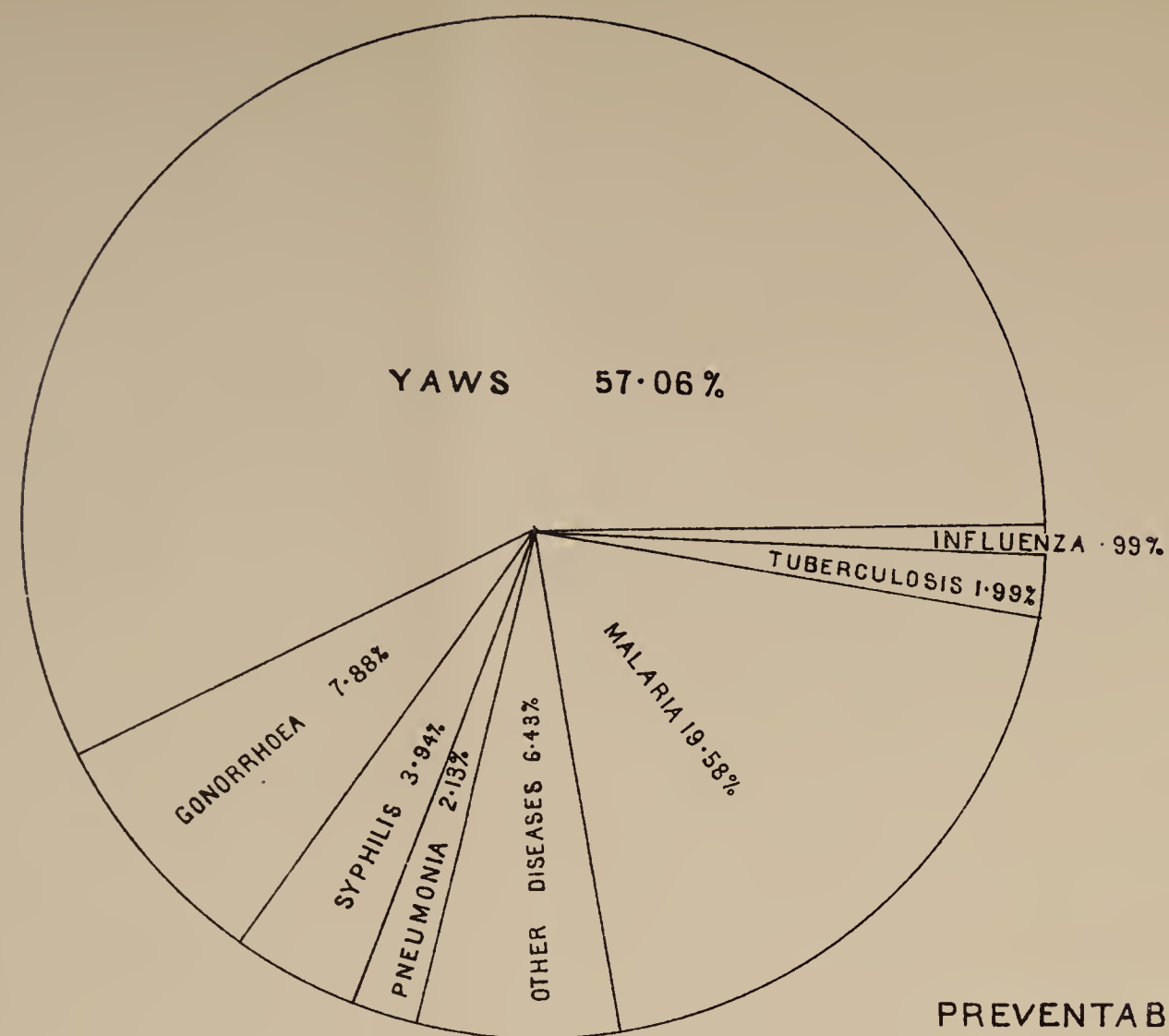
The health of the general African community compares favourably on the whole with the record of previous years, the continuance of the yellow fever outbreak from the previous year being the chief cause for anxiety. It should, however, be noted that the incidence of the disease as compared with the total population of the country was not serious. The gravity in the case of yellow fever consists chiefly in its danger to the more susceptible elements.

The continued steady rise in the numbers seeking relief at the various Hospitals and Dispensaries is very satisfactory indeed.

In 1924-25 the total number of cases treated was 82,476. The increase on this figure in the following year was 18.5 per cent. Next year the increase was 7.5 per cent over its preceding year and the increase in the figures for the year under review over those of 1926-27 was 26.42 per cent. The yearly advance in the numbers coming forward for treatment is, therefore, being well maintained.

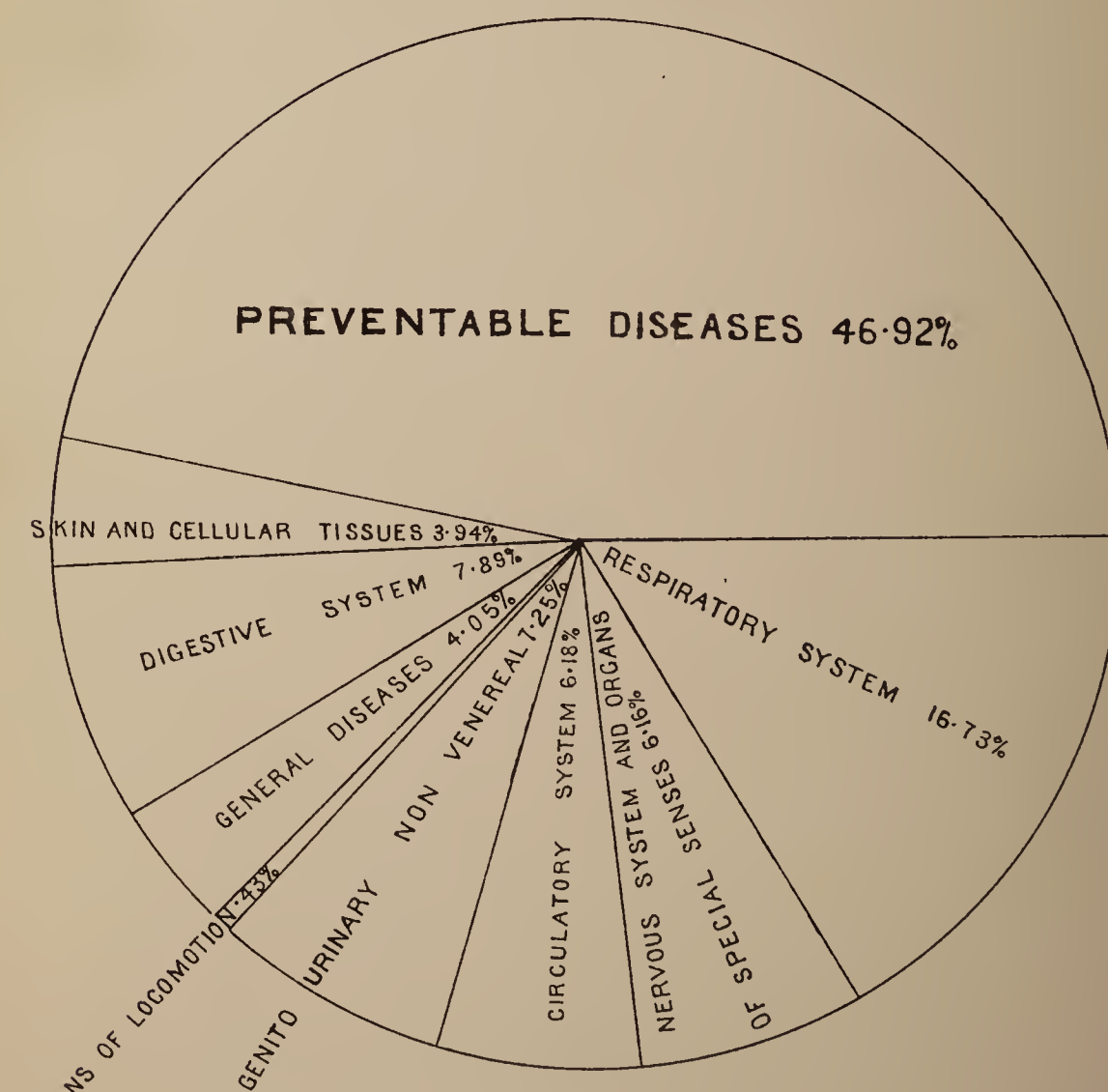
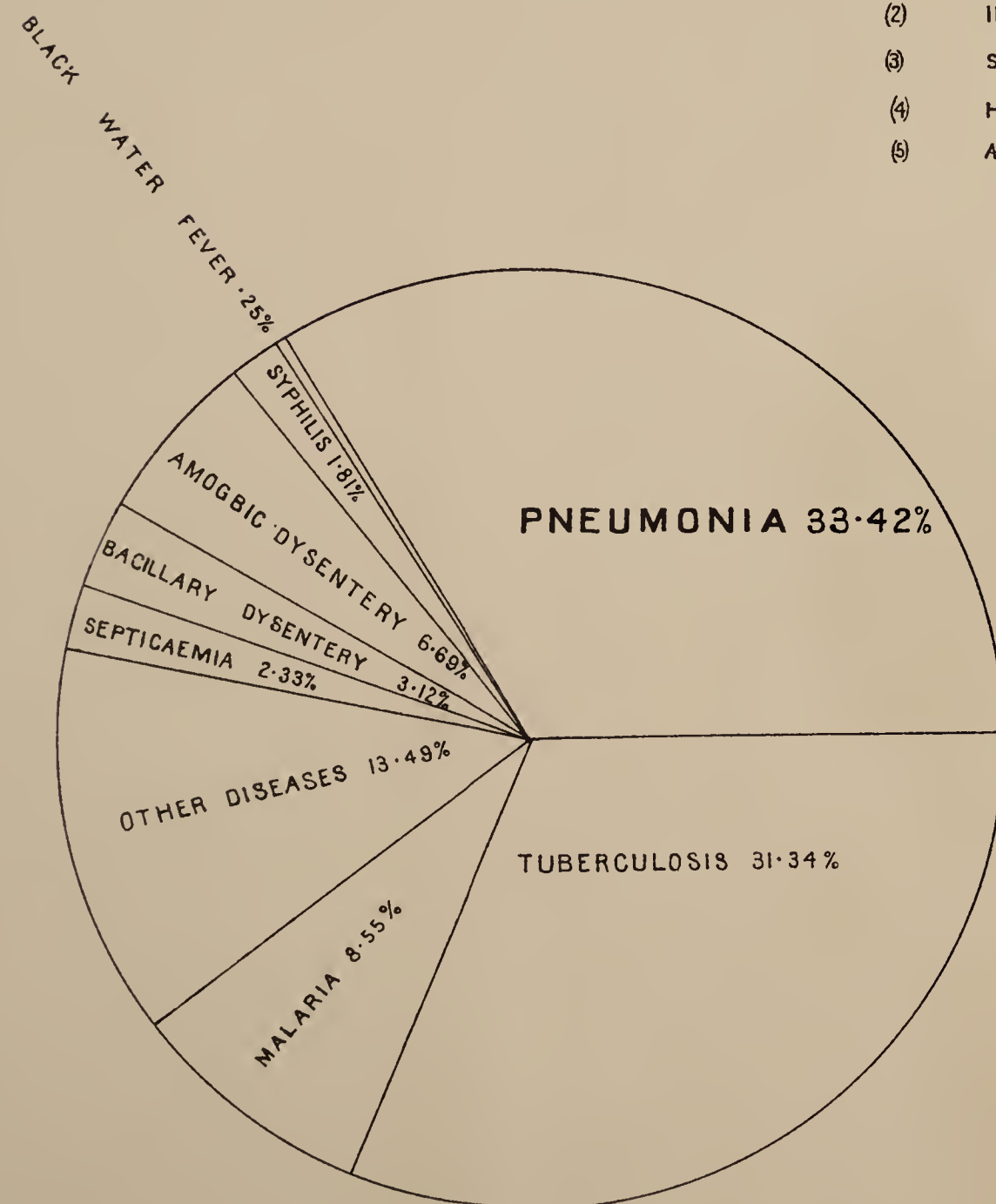






PREVENTABLE DISEASES ARE:-

- (1) INFECTIOUS DISEASES.
- (2) INTOXICATION AND POISONS.
- (3) SCABIES AND TINEAE.
- (4) HELMINTHS.
- (5) AFFECTIONS PRODUCED BY EXTERNAL CAUSES.



TOTAL DEATHS = 386.84% OF TOTAL INCIDENCE

TOTAL DEATHS- 938.73% OF TOTAL INCIDENCE

The total number of deaths shows both a small absolute increase and a small increase relative to the total number of cases treated over the figures for the preceding year. The average percentage of deaths to the total of patients treated over the three-year period from 1925 to 1928 was .76 per cent. The average for the year under review shows therefore a slight decline on the three-year average.

In the remarks given below the figures are in most cases taken from the Hospital and Dispensary returns furnished by the Medical Branch. These differ in places from those given by the Sanitation Branch owing to the fact that treatment is often given by the latter branch in Contagious Diseases Hospitals, temporary isolation camps, villages, etc.

#### I. GENERAL DISEASES.

These scarcely call for special observation, as they are not a more common cause of ill-health in the tropics than in temperate countries.

#### II. COMMUNICABLE DISEASES.

These cause most of the ill-health from which the community suffers.

(a) Mosquito or Insect-borne.	1925-26.	1926-27.	1927-28.
Malaria ...	6,574	6,444	8,955

As compared with the previous year and as compared with the total of all cases treated there was an increase both absolute and relative in the numbers treated.

These figures can indicate either increased incidence or an increase in the numbers seeking treatment; most probably the latter.

The total 8,955 equalled 6.72 per cent of the total of all diseases treated.

#### BLACKWATER FEVER.

Sixteen cases were treated with only one death.

The following Tables are of interest :—

#### FIVE YEARS PERIOD 1917-21.

Year.	Total Europeans resident. Officials and Non- Officials.	Total Cases.	Total Deaths.
1917 .. .. .	2,172	24	8
1918 .. .. .	1,823	17	6
1919 .. .. .	3,182	20	8
1920 .. .. .	2,818	36	10
1921 .. .. .	2,939	19	9
Totals .. .. .	12,934	116	41

Percentage of cases to total Resident ... .89

Percentage of Deaths to cases ... .. 35.3



## FIVE YEARS PERIOD 1923-24—1927-28.

Year.						Total Europeans resident. Officials and Non- Officials.	Total Cases.	Total Deaths.
1923-24	..	..	..	..	..	3,043	21	7
1924-25	..	..	..	..	..	2,866	16	2
1925-26	..	..	..	..	..	3,104	18	4
1926-27	..	..	..	..	..	3,481	5	4
1927-28	..	..	..	..	..	3,578	16	1
Totals .. .. .						16,072	76	18

Percentage of cases to total resident ... .. .47

Percentage of deaths to cases ... .. .23.7

(The short period January, 1922 to March, 1923, is omitted, as during this period there was an alteration in the year to be taken upon which the Annual Report was to be rendered).

It is very satisfactory to note the considerable drop in the percentage of residents attacked. This is no doubt due largely to the general improvement in conditions of life and also in some part to the greater personal care taken in the use of nets, quinine, etc.

The drop in case mortality is also satisfactory, but is still high and shows that blackwater fever is always a highly dangerous affection.

## TRYPANOSOMIASIS.

					In and Out-patients.	
					1926-27.	1927-28.
Cases	...	...	...	...	67	59
Deaths	...	...	...	...	11	4

A decrease of eight on 1926-27 is shown, but an increase on the average of the preceding three years, possibly due to the fact that more cases are coming forward for treatment.

An interesting Report on the treatment of Trypanosomiasis by Bayer 205 is included as an appendix to the present report (Appendix B.) That Western Ashanti is the home of endemic human trypanosomiasis of a very chronic type and from which a very large number of people recover was the opinion expressed by Dr. Kinghorn in 1910, and by Dr. W. A. Young, Director of Medical Research Institute, as a result of investigations in the area in 1925-26.

## YELLOW FEVER.

The outbreak of the previous year continued with little remission. The rapid extension of lines of communication, the improvement in the means of transport and the consequent increasing contact of more susceptible races with the African community, before the staff of the sanitation branch was correspondingly enlarged to extend its control, would appear to be among the chief reasons for the widespread incidence of the cases.

It was pointed out in last year's report how severely those susceptibles who did not live in residential areas suffered. The figures for official and non-official Europeans for the year under review emphasize in an unmistakable manner the high protective value of these residential areas.

To bring this fact into further prominence a table is given below showing the incidence of deaths from yellow fever in both official and non-official Europeans for the years, since 1910, during which yellow fever was most active.

TABLE SHOWING INCIDENCE OF EUROPEAN (OFFICIAL AND NON-OFFICIAL) DEATHS FROM YELLOW FEVER IN THE CHIEF OUTBREAKS SINCE 1910.

Year.	Total cases in Colony (all races).	Total Deaths in Colony (all races).	Total Officials resident.	Total Deaths of Officials.	Percentage of Deaths to total Officials resident.	Total Non- officials resident.	Total Deaths in Non- officials.	Percentage of Deaths to total Non- officials resident.
1910 .. ..	15	14	475	2	.42	1,217	8	.65
1922-23 .. ..	23	15	979	1	.10	2,019	6	.29
1923-24 .. ..	13	11	994	2	.20	2,049	8	.39
1924-25 .. ..	10	7	846	3*	.35	2,020	1	.04
1926-27 .. ..	86	24	1,046	1	.09	2,435	4	.16
1927-28 .. ..	84	34	1,202	0	0.00	2,375	12	.50

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\*(Two of these Europeans lived at the Accra Water Works in close proximity to the native village of Weshiang. The third used to work in an office in the native town of Koforidua near the house where three Syrians lived who had died shortly before of Yellow Fever).



In 1910, in Sekondi, the segregation of European officials was only partial. Since that date the policy of establishing residential areas has been steadily pursued.

The average percentage of deaths to total residents works out for the years given above as .23 per cent for officials as compared with .41 per cent for non-officials. This means that non-officials have suffered almost twice as severely as officials from this disease. Meanwhile, in order to cope with the new conditions created by the wide extension of the lines of communication and the rapid improvement in the means of transport, steps were taken to increase considerably the personnel of the sanitation branch, the usual anti-mosquito measures were intensified and by these means the outbreak was speedily controlled. The opportunity is being taken of impressing on the mercantile community the paramount importance of securing accommodation for their employees in the special residential areas provided by Government.

During the year, researches having results of the greatest scientific interest and value were carried out by the West Africa Yellow Fever Commission of the Rockefeller Foundation, and at the moment of writing the production of a preventive vaccine seems within sight of being achieved. In view of West African conditions such a discovery would be a priceless boon.

#### RELAPSING FEVER (SP. OBERMEIERI).

This disease was first recognised on the Gold Coast in 1923, and re-appeared as a serious outbreak in Kumasi in March, 1927, amongst the Zabrama labourers from French Senegal and Niger. The vector has been conclusively shown to be the louse and the disease spreads amongst the unwashed.

The figures given by the sanitation branch show that in all 156 cases with seven deaths were reported. These figures are a cause of some anxiety although every effort is being made to stamp out the disease and prevent its taking root in the Colony.

It is not likely to spread in parts where water supplies are good—as in the forest belt—but at any time it may break out and assume serious proportions in the Northern Territories where conditions of drought for considerable periods can occur.

### (b) INFECTIOUS DISEASES.

#### SMALL-POX.

The low figure of 34 cases as recorded by the Sanitation Branch for the year is very satisfactory to note, and shows that the intensive campaign of vaccination has fully justified itself. The outbreak in the Northern Territories began in January, 1925, and the last case was discharged at Zuarungu in September, 1927.

#### DYSENTERY.

The total of 1,008 cases shews an increase of 168 on the previous year. The bacillary form shows a higher case mortality than amebic; 9.23% as compared with 4%.

#### INFLUENZA.

452 cases with no deaths were recorded. The type was fortunately mild in character.

#### PNEUMONIA.

An increase is shown; there being 976 as compared with 788 for the previous year. The case mortality was 10.32 per cent as compared with 9.5 per cent for the previous year, which itself was less by 3 per cent than that of 1925-26.

#### TUBERCULOSIS.

Again shows an increase. The advance although somewhat disquieting is not yet of sufficient proportion to cause serious alarm, for it should be noted that the number of cases of tuberculosis relative to the total number of all cases shows a very small increase only. It is difficult to estimate accurately the extent to which tuberculosis is really increasing.





\* One believed to have been infected at Brofoyedru near Obuasi died at Cape Coast but is included in the number for Obuasi and not in that for Cape Coast.

Survey H.Q. Accra, 1928.





The following table illustrates the above remarks :—

#### TUBERCULOSIS—ALL STATIONS.

	1923-24.	1924-25.	1925-26.	1926-27.	1927-28.
Cases .. .. .	411	414	571	698	910
Percentage of Tuber- culosis cases to all cases treated.	.53	.50	.58	.66	.68

It is not, therefore, considered justifiable at this stage to enter on such costly experiments as village settlements. On the other hand it is considered that to continue the present system of treating cases in general wards—segregated as far as possible—is unsatisfactory, being obviously dangerous to other patients, besides causing beds to be occupied which would otherwise be occupied by more hopeful cases.

It was proposed in 1926, that an additional tuberculosis half-block be added to the Gold Coast hospital with a specially selected tuberculosis officer in charge. The object in view was to gain further experience of the prevalence and type of the disease and results of treatment and at the end of a few years to take stock of the position. The proposal was deferred on grounds of finance.

It is still considered that this is the best line of action, being, as it is, consistent with the findings of the third conference of the senior members of the West African medical staff.

Should it, after the information has been collected, be decided that some form of sanatorium or village centre is advisable, the half-block will then come into use as a normal extension of the Gold Coast Hospital, and the risk of loss, if a sanatorium is established now, and prove a failure, be thus obviated.

#### VENEREAL DISEASES.

The cases treated during the year, as compared with last year were as follows :—

	1926-27.	1927-28.
Gonorrhoea .. .. .	3,769	3,356
Syphilis .. .. .	1,277	1,802
Chancroid .. .. .	246	295

The report of the venereal clinic, Accra, will be found under a special section elsewhere.

#### LEPROSY.

During the year 830 cases were treated with one death, an increase of 162 cases on the previous year's record. This is due not to any increased incidence but to the fact that sufferers are coming forward in greater numbers voluntarily for treatment.

A brief report on the activities of the new leper settlement at Ho, Togoland is given in Appendix D.

Early in 1926, the Secretary of the British Empire Leprosy Relief Association visited the Gold Coast Colony. As a result it was decided to form a Central Branch of the association at Accra with subsidiary branches for Ashanti and the Northern Territories at Kumasi and Tamale, and it was further decided that a whole time specially trained Medical Secretary to the Local Branch should be appointed and paid by Government, whose function should be, working in co-operation with the Medical Department, to make a leprosy survey of the Colony, collect statistics, assist in co-ordinating the work of the local branches to good purpose, and advise Government as to the prevalence of leprosy, the number of settlements required, etc.



He had not arrived at the end of the year under review, but will arrive early in the following year, and it is hoped that a more accurate idea of the prevalence of leprosy will then be obtained and plans formed for extending relief to those affected.

#### ANKYLOSTOMIASIS.

275 cases with 10 deaths were recorded during the year. Most of the fatal cases reported were, as before, from the Axim district. It is under consideration to detail a Medical Officer, when one is available, to tour this area with a mobile dispensary in order to survey and determine the most highly infested parts and to institute treatment, individual or mass, as indicated by his findings.

### (b) VITAL STATISTICS.

#### GENERAL EUROPEAN POPULATION.

	1926-27	1927-28
(i) Government Officials .. .. .	1,046	1,202
(ii) Employees of Trading Firms .. .. .	1,861	1,737
(iii) Employees of Mining Companies .. .. .	440	486
(iv) Missionaries .. .. .	134	152
Total .. .. .	3,481	3,577

An increase of 156 Government officials over the previous year took place and a decrease of 60 non-officials.

### (1) EUROPEAN OFFICIALS.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES.

	1925-26.	1926-27.	1927-28.
Total number of Officials resident .. .. .	994	1,046	1,202
Average number resident .. .. .	761	783	835
Total number on the Sick List .. .. .	781	795	792
Total number of days on Sick List .. .. .	6,108	6,847	7,023
Average daily number on Sick List .. .. .	16.70	18.75	19.24
Percentage of Sick to average number resident	2.19	2.39	2.30
Average number of days on Sick List for each patient.	7.82	8.61	8.86
Average sick time to each resident .. .. .	8.02	8.72	8.41
Total number invalided .. .. .	59	49	39
Percentage of invalidings to total residents ..	5.93	4.68	3.24
Percentage of invalidings to average number resident.	7.75	6.26	4.67
Total Deaths .. .. .	8	3	6
Percentage of deaths to total residents ..	0.80	0.28	0.49
Percentage of deaths to average number of residents.	1.05	0.38	0.71
Number of cases of sickness contracted away from residence.	—	Not available.	Not available.

NUMBER OF DAYS ON SICK LIST.

				1925-26.	1926-27.	1927-28
Tropical Diseases	..	..	..	2,410	2,734	2,368
Non-tropical Diseases	..	..	..	3,698	4,113	4,655
Total				6,108	6,847	7,023

*Causes of Invaliding of Europeans Officials.*—Perinephritic Abscess 1, Duodenal Ulcer 1, Para-typhoid A. 1, Compound Fracture of left leg 1, Sleeplessness 1, Cardiac Weakness 1, Valvular Disease of the Heart 1, Blackwater Fever 1, Alcoholism 1, Yellow Fever 2, Chronic Nephritis 1, Mitral Regurgitation and Emphysema 1, Neurasthenia and Debility 1, Concussion, Headache, Loss of Memory and Mental Depression 1, Fracture of left Tibia 1, Food Poisoning 1, Old Injury to knee 1, Headache and Abdominal Pains 1, Insomnia 3, Rheumatic Purpura 1, Insomnia and Nervousness 1, Neurasthenia 1, Vague Gastro-Intestinal trouble 1, Amoebic Dysentery 1, Debility 5, Dengue Fever 1, Remittent Malaria and Secondary Anaemia 1, Malarial Cachexia 1, Fracture Leg 1, Fracture anterior fossa of base of skull 1, Malaria 1, Subtertian Malaria 1—total 39.

Of the 39 officials invalided only 4 were military.

*Causes of Deaths of European Officials.*—Lobar Pneumonia 1, Blackwater Fever 1, Septicaemia 1, Cellulitis with Broncho-pneumonia and Septicaemia 1, Cardiac failure due to Toxaemia 1, Carcinoma of the Oesophagus 1—total 6.

EUROPEAN OFFICIALS—INVALIDINGS.  
ANALYSIS OF RESIDENTIAL SERVICE.

Serving under	Residential Service.						Total.
	Under 6 months.	6 but under 9.	9 but under 12.	12 but under 15.	15 but under 18.	18 months and over.	
Old Leave Regulations	2	—	2	1	—	—	5
New Leave Regulations	3	6	4	10	9	2	34
Total .. ..							39

Invaliding Rate per 1,000.

1925-26	..	..	..	..	..	59.35
1926-27	..	..	..	..	..	46.84
1927-28	..	..	..	..	..	32.44

Death Rate per 1,000.

1925-26	..	..	..	..	..	8.04
1926-27	..	..	..	..	..	2.87
1927-28	..	..	..	..	..	4.99



## EUROPEAN MORTALITY AND INVALIDING RATES FOR THE YEAR.

	No.	Deaths.	Invalidings.	Death Rate per 1,000.	Invaliding Rate per 1,000.
Officials .. ..	1,202	6	39	4.99	32.44
Non-officials ..	2,375	21	48	8.84	20.21

## II.—EUROPEAN NON-OFFICIALS.

Table shewing Invaliding and Death Rates.

1925-26.	No.	Deaths.	Invalided.	Death Rate per cent.	Invaliding Rate per cent.
Merchants .. ..	1,529	10	36	0.65	2.35
Mining Companies ..	469	3	23	0.63	4.90
Missionaries .. ..	118	1	7	0.89	6.25
Totals .. ..	2,116	14	66	0.66	3.12
1926-27.					
Merchants .. ..	1,861	13	49	0.69	2.63
Mining Companies ..	440	5	15	1.13	3.40
Missionaries .. ..	134	5	1	3.73	0.74
Totals .. ..	2,435	23	65	0.94	2.66
1927-1928.					
Merchants .. ..	1,737	16	30	0.92	1.72
Mining Companies ..	486	—	16	—	3.29
Missionaries .. ..	152	5	2	3.28	1.31
Totals .. ..	2,375	21	48	0.88	2.02

*Causes of Invaliding of Non-official Europeans.*—Cerebral Haemorrhage 1, Subtertian Malaria 4, Blackwater Fever 3, Unclassified Fever 1, Haemarthrosis of knee 1, Influenza 1, Gonorrhoeal Conjunctivitis 1, Remittent Fever 1, Venereal Disease 1, Cardiac Disease 1, Pelvic Peritonitis 1, Para-typhoid 1, Valvular Disease of the Heart 2, Hydronephrosis and Malignant Tertian Malaria 1, Sunstroke 1, Concussion 1, Fractured Pelvis 1, Neurasthenia 3, Haemoglobinuric Fever 2, Pulmonary Tuberculosis 2, Carbuncle and Neurasthenia 2, Chronic Bronchitis 2, Malaria 4, Appendicitis 4, Yellow Fever 1, Bronchitis 1, Retention of Urine 1, Pleurisy 1, Trichiniasis 1, Chronic Nephritis 1—total 48.

*Causes of Deaths of Non-official Europeans.*—Yellow Fever 12, Perinephritic Abscess 1, Heat-stroke 1, Appendicitis and General Peritonitis 1, Ruptured Aortic Aneurysm 2, Hepatic Abscess 1, Acute Malaria 1, Dysentery 1, Drowning 1—total 21.

## III.—AFRICAN OFFICIALS.

Table shewing Sick, Invaliding and Death Rates.

	1925-26.	1926-27.	1927-28.
Total number of Officials resident .. ..	2,881	3,512	3,771
Average number resident .. ..	2,723	3,382	3,460
Total number on the Sick List .. ..	888	771	744
Total number of days on Sick List .. ..	8,967	8,492	7,463
Average daily number on Sick List .. ..	24.56	23.26	20.44
Percentage of Sick to average number resident	0.89	0.68	0.59
Average number of days on sick List for each patient.	10.09	11.01	10.03
Average sick time to each resident .. ..	3.39	2.51	2.15
Total number invalided .. ..	18	29	22
Percentage of invalidings to total residents ..	0.62	0.82	0.58
Percentage of invalidings to average number resident.	0.66	0.86	0.64
Total deaths .. ..	28	22	20
Percentage of deaths to total residents ..	0.97	0.62	0.53
Percentage of deaths to average number resident.	1.02	0.65	0.57
Number of cases of sickness contracted away from residence.	—	Not avail- able.	Not avail- able.

*Causes of Invaliding of African Officials.*—Long continued over-indulgence combined with lack of exercise 1, Glaucoma 1, Defective vision 2, Myocarditis Arterio-sclerosis and Urethral stricture 1, Mitral Stenosis and Regurgitation 1, Ascites Dyspnoea 1, Chronic Alcoholism 1, Carcinoma at the junction of oesophagus and stomach 1, Chronic Bronchitis and Emphysema 1, Right Inguinal Hernia 1, Tuberculosis 1, Optic Neuritis 1, Chronic Pharyngitis 1, Neurasthenia 1, Early Dementia 1, Mental sickness 1, Ankylosis of Right shoulder joint 1, Cholesteatoma of right ear 1, Epilepsy 1, Syphilis 1, Chronic Nephritis and Morbus Cordis 1—total 22.

*Causes of Deaths of African Officials.*—Malignant Disease of Liver 1, Pulmonary Tuberculosis 2, Cardiac failure following Filariasis and Cirrhosis of Liver 1, Thrombosed Piles with Pyaemia 1, Yellow Fever 1, Morbus Cordis 2, Cardiac Failure 2, Tetanus 1, Parenchymatous Nephritis and Uraemia of Toxic origin 1, Typhoid Fever 1, Heart Failure following Pneumonia 1, Lobar Pneumonia 1, Pneumonia 1, Phthisis 1, Septicaemia 1, Carcinoma of Liver 1, Chronic Interstitial Nephritis and Uraemia 1—total 20.

## IV.—GENERAL AFRICAN POPULATION.

The following Table gives the statistics in six of the principal towns in the Colony and Ashanti for the calendar year 1927, together with the corresponding figures for previous years:—



Town.	Deaths.				Births.				Infant Mortality Rates.			
	1924-25.	1925-26.	1926-27.	1927-28.	1924-25.	1925-26.	1926-27.	1927-28.	1924-25.	1925-26.	1926-27.	1927-28.
Accra ..	986	1,207	1,130	1,233	1,000	1,082	2,095	2,030	203	258	124	128
Kumasi ..	498	428	436	524	439	581	550	474	77	77	110	142
Cape Coast ..	283	341	315	325	315	219	306	273	82	123	124	124
Sekondi ..	437	309	375	324	160	150	242	235	112	173	61	68
Kofofidua ..	231	238	239	215	51	39	173	187	647	769	196	176
Tarkwa ..	134	125	190	190	50	29	72	34	240	172	152	382
Total ..	2,569	2,648	2,685	2,811	2,015	2,100	3,438	3,233	—	—	—	—

It must be realised that all these vital statistics are necessarily inaccurate in a Colony where large areas are without any form of births and deaths registration, where crude figures only are available in registration districts, and where not every birth or death is reported.

### III.—HYGIENE AND SANITATION.

#### A.—GENERAL REVIEW OF WORK DONE AND PROGRESS MADE.

##### *Preventive Measures.*

#### I.—MOSQUITO AND INSECT-BORNE DISEASES.

##### (a) MALARIA.

Routine anti-mosquito work was carried out during the year. The table given below affords some idea of malarial infection in school children up to the age of twelve years in five of the more important centres.

TABLE I.

Town.	Percentage of Enlarged Spleens
Accra .. ..	34.40
Sekondi .. ..	24.30
Koforidua .. ..	58.10
Kumasi .. ..	28.60
Tamale .. ..	18.09

##### (b) YELLOW FEVER.

Eighteen separate areas were infected with one or more cases of yellow fever in 1927-28, the most serious outbreaks being situated in Accra and in Late.

Particulars of the Accra outbreak have been published already in Sessional Paper No. XXVII of 1927-28. (*Vide* Appendix G.)

The year 1927 was distinguished by the fact that the number of cases and deaths among Europeans had only been exceeded in 1910 and 1923, and that the number of cases and deaths in Africans was larger than during any previous year.

TABLE II.

Place.	Number of Cases.			Number of Deaths.		
	European.	African.	Syrian.	European.	African.	Syrian.
Accra .. ..	4	9	3	4	4	3
Agate .. ..	—	1	—	—	1	—
Agomeda .. ..	—	1	—	—	—	—
Akuse .. ..	—	1	—	—	—	—
Akwamu .. ..	—	1	—	—	—	—
Bame .. ..	—	6	—	—	1	—
Cape Coast .. ..	2	—	—	1	—	—
Elmina .. ..	1	—	—	1	—	—
Gbefi .. ..	—	1	—	—	1	—
Ho .. ..	1	2	—	—	—	—
Koforidua .. ..	—	1	—	—	1	—
Kpando .. ..	—	2	—	—	2	—
Kpeve .. ..	2	4	—	—	1	—
Late .. ..	—	32	—	—	4	—
Nsawam .. ..	—	2	—	—	1	—
Obuasi* .. ..	2	—	—	2	—	—
Somanya .. ..	2	1	—	2	1	—
Sra .. ..	—	3	—	—	2	—
Totals .. ..	14	67	3	10	19	3

\* One believed to have been infected at Brofoyedru near Obuasi.



Efforts were made to reduce the *Aedes* index as much as possible particularly in areas where the disease occurred.

(c) FILARIASIS.

This condition is rarely met with in the Gold Coast.

(d) TRYPANOSOMIASIS.

A small number of cases of this disease was reported principally from Ashanti. The Medical Officer, Kintampo, reported that several small foci existed in the Western Province of Ashanti, wherein five per centum of the population were infected.

Taking the Colony as a whole it is impossible to give even an approximate figure for the percentage of population infected with this disease.

As regards preventive measures, efforts are made to clear "bush" from the vicinity of dwelling houses; headmen of villages in the neighbourhood of fords infested with tsetse are persuaded to keep the fords clear from vegetation and, thirdly, actual cases receive treatment with a view to sterilising their bloodstreams.

## 2.—INFECTIOUS DISEASES.

(a) CEREBRO-SPINAL MENINGITIS.

Apart from a very small number of cases scattered throughout the Colony the only serious group was discovered in the village of Afransi in the Bekwai division of the Obuasi district. Seven cases resulted in three deaths but immediate steps were taken locally to stop the spread and the outbreak was effectually stamped out.

For all forms of cerebro-spinal meningitis twelve cases with five deaths were recorded in the Colony as a whole.

Thorough ventilation of dwelling houses and attempts to prevent congestion of buildings form the main lines of prevention.

(b) DYSENTERY.

Between the 2nd of April, 1927, and the 31st of March, 1928, the numbers of cases and deaths from all forms of dysentery reported in weekly telegrams from 24 stations were as follows:—

TABLE III.

	Colony.	Ashanti.	Northern Territories.	Total.
Cases .. ..	641	83	30	754
Deaths .. ..	62	8	1	71

(c) ENTERIC.

This is not an important disease in the Gold Coast from the epidemiological standpoint.

A small number of cases occurred at Sekondi among Africans. The source of infection was not discovered.

The quality of the pipe-borne water supply never gave cause for alarm.

(d) PLAGUE.

Reports were received of the presence of plague in the Canary Islands, Senegal and Nigeria, but the Gold Coast remained free from the disease.

Steps were taken to minimise the danger of the introduction of plague-infected rats in Takoradi by drawing up legislation relating to shipping, the use of rat-guards, etc.

In seven of the more important ports and towns some 86,627 rats were destroyed during the year, none of which were plague-infected.

## (e) SMALLPOX.

The incidence of this disease in 1927-28, is shown hereunder.

TABLE IV.

	Colony.	Ashanti.	Northern Territories.	Total.
Cases .. ..	22	—	12	34
Deaths .. ..	1	—	3	4

The small number of cases is probably accounted for by the very extensive vaccination campaigns that have been prosecuted in the last few years and are still being energetically carried on. Little or no opposition is offered to vaccination which has been made compulsory over a large portion of the Gold Coast.

TABLE V.

	1925-26.	1926-27.	1927-28.
Total number vaccinated .. ..	311,927	243,675	232,300
Total number verified successful .. ..	98,869	135,837	82,004
Percentage verified successful .. ..	31.69	55.78	35.3

The services of twelve vaccinators were utilised during the period under review. Lanolinated lymph from the Lister Institute gave complete satisfaction.

## (f) LEPROSY.

Towards the end of the period under review, a Medical Officer with special training in the treatment of leprosy landed in the Gold Coast.

The Medical Officer at Ho reported that 353 lepers attended the out-patient department and that 95 were admitted to the temporary settlement making 173, with those remaining in the settlement at the end of the previous yearly period.

Of the 173, one died, six were reported cured, fifty-two improved and were discharged on parole, two ran away, and twenty-one who were given leave did not return. Fifteen of those discharged on parole were re-admitted.

The Medical Officer of Health, Accra, reported that fifty-nine cases of leprosy were treated in the temporary leper settlement at Accra during the year, and that treatment with sodium hydriocarpate appeared to be attended by beneficial results.

The Medical Officer, Kwahu, reported that forty-eight lepers had been treated at the centre during the year.

The Medical Officer of Health, Kumasi, reported that seventeen lepers had been treated as in-patients there, and that increasing numbers of out-patients had also been treated at the Contagious Diseases Hospital.

The Acting Medical Officer of Health, Tarkwa, reported that there were four inmates in the temporary leper settlement there.

## (g) ANTHRAX.

An ox suffering from anthrax was landed at Accra from Lagos in July, 1927, the necessary steps being taken to dispose of its carcase. Six human cases were reported from the Kintampo district towards the end of the year under review, all of which ended fatally. The human cases were traceable to the consumption of infected beef.

## (h) RELAPSING FEVER.

Apart from a few isolated cases, outbreaks of this disease were confined to Kumasi, Ashanti, where sixty-six cases and three deaths were reported during 1927-28, and to Suhum, Colony, where thirty-two cases—one of which was fatal—occurred towards the end of the same period.



In each instance the patients belonged to tribes whose habitat lies to the north of the Northern Territories. In all 156 cases with seven deaths—a case mortality of 4.4 per centum—were recorded in 1927.

Isolation of patients and contacts, disinfestation of both, and treatment of the former with novarsenobillon constituted the principal methods of attack against the disease.

(i) TUBERCULOSIS.

The following figures are collected from the returns of vital statistics from Accra, Cape Coast, Sekondi, Tarkwa, Koforidua and Kumasi, and relate to deaths from tuberculosis practically all of which is of the pulmonary type:—Accra 92, Cape Coast 40, Sekondi 54, Tarkwa 56, Koforidua 14, Kumasi 28. There is no special accommodation for those tubercular cases diagnosed at an out-patient department and in any case the prevention of this disease necessitates a radical alteration in the personal habits and manners of the average native, together with improved housing conditions and diminution of overcrowding. This latter work is progressing slowly but surely in spite of many setbacks and delays.

### 3.—HELMINTHIC DISEASES.

(a) ANKYLOSTOMIASIS.

The greatest incidence of this disease among the general population was noted as usual at Axim where six deaths from the condition were registered, fifty-nine persons reporting for treatment of the disease during the year.

The provision of latrines and the prevention of promiscuous fouling were the more important methods adopted to prevent infection coupled with the treatment of persons known to be harbouring ankylostomes.

(b) DRACONTIASIS.

This condition is commonly met with in all areas where the quality and quantity of the water is poor, but especially in the Northern Territories.

A large number of troops at Tamale reported sick with the condition and the source of infection was thought to have been one of the wells in the Cantonments at Tamale. But it is far more probable that the infection was due to the ineradicable habit of the northern tribes of drinking surface water from any source, however foul. The troops are recruited from all over the Northern Territories and even when locally recruited in Tamale, frequently go outside the town and drink from other water supplies.

General encouragement was given to protect wells and water holes from infection with *F. medinensis*.

(c) ASCARIASIS.

Adults and children alike suffer from this condition in large numbers, but the severe anæmias and œdematous conditions seen in the East are infrequently met with in the Gold Coast. Anti-fly measures and the adoption of a satisfactory type of latrine and discouragement of fouling of land constituted the more important preventive measures.

(d) TAENIASIS.

Human tæniasis is not uncommon.

The amount of infection in animals is given below. Meat inspection was carried out in all larger stations and promiscuous defaecation was discouraged as far as possible.

(e) SCHISTOSOMIASIS.

This condition is not common but small groups of cases occasionally come under notice. Six men in the Gold Coast Regiment were found to be suffering from this disease while in camp in the Akuse district.

Infection would not appear to have been contracted in Kumasi. *Mutatis mutandis* the remarks in the second paragraph under “ Dracontiasis ” apply here also.

The provision of adequate latrine accommodation was enforced where possible.

## 4.—ANIMAL DISEASES.

A serious outbreak of rinderpest affected the herds grazing in the Adabraka-Labadi-Teshi area near Accra early in the year under review.

Cattle owners suffered great loss as their herds were decimated. The origin of the infection remained undiscovered.

Anthrax in cattle in the Western Province of Ashanti was ultimately responsible for eight deaths among the local inhabitants.

The Medical Officer of Health, Accra, reported that 58 out of 2,031 cattle slaughtered showed infection with *Cysticercus bovis* and that 981 out of 4,187 pigs slaughtered were infected with *Cysticercus cellulosae*. In Kumasi, 118 out of 1,900 cattle and five out of 332 pigs slaughtered were found to have cysticercal infection.

The comparative rates for such infection were 2.8 and 23.3 in cattle and pigs in Accra, and 6.2 and 1.5 in cattle and pigs in Kumasi.

The majority of the cattle and pigs come to Accra *via* Keta, Ada, etc., which is a particularly well-populated district remarkable for the insanitary state of the villages.

## 5.—SEASONAL PREVALENCE OF DISEASES.

## (a) RESPIRATORY DISEASES.

As might be expected respiratory diseases are common between December and February when the harmattan is blowing.

The close association between influenza and pulmonary conditions was particularly marked in 1927-28.

## (b) GASTRO-ENTERIC DISEASES.

Diseases of the gastro-enteric type showed no seasonal variation.

## (c) INFECTIOUS DISEASES.

*Relapsing Fever.*

Both the outbreak at Kumasi and at Suhum occurred towards the end of a dry season and, as the disease was proved to be louse-borne, it is possible that shortage of water for washing bodies and clothes may have had some influence on the occurrence of the disease.

## (d) YELLOW FEVER.

The statements of Boyce and others to the effect that cases of yellow fever were to be looked for during and at the beginning of the rains are undoubtedly true so far as they go. Further local knowledge, however, justifies the amplification of these statements and it is now a fact that at any time of the year in the Gold Coast, yellow fever cases may be expected; there is no "close season" for this disease.

## (e) MALARIA.

In certain localities, malaria appears to be somewhat more common at the commencement of the rains and towards their end. The Medical Officer of Health, Koforidua, suggests that this may be accounted for by the fact that the flow of surface water favours pool formation at such times.

The following table of distribution of twelve hundred cases of malaria treated at the Koforidua hospital is of interest.

TABLE VI.

Month,	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
No. of Cases	138	165	112	90	76	51	66	118	99	118	104	63
Rainfall in inches.	9.61	6.27	7.10	3.61	0.40	6.53	7.31	2.97	7.62	0.19	0.50	7.52



## II.—GENERAL MEASURES OF SANITATION.

### (a) SEWAGE DISPOSAL.

The pan system of disposal is in vogue in all the larger centres in the Colony supplemented in Accra by a small number of water-carriage latrines, public and private, and in certain other seaport towns by sea latrines.

In other centres and throughout the Colony pit latrines of the open or covered type and smoke latrines are in use.

### (b) SCAVENGING AND REFUSE DISPOSAL.

In the larger townships refuse is removed from public dustbins to incinerators or burning dumps by motor lorry and elsewhere by head load ; and the indestructible portion is used for filling in marshes and excavations.

### (c) DRAINAGE.

As funds permit, permanent concrete drains are constructed in the more important centres while auxiliary systems of earth channels are dug elsewhere.

The main key drain at Kumasi has resulted in very considerable improvement in local conditions and extensions are contemplated.

The conditions of health at Saltpond have equally undergone great amelioration by the filling in of the major portion of the lagoon and by the construction of earth channels and herring-bone cuts.

### (d) WATER SUPPLIES.

The quality of the pipe-line waters supplied at Accra and Sekondi, including Takoradi, is discussed below.

No bacteriological analyses of the Winneba water supply were made. In the case of Accra the growing consumption made it necessary to devise a system of increasing the amount available and it is proposed to construct a service reservoir capable of containing a million gallons on high ground close to the town.

The system of chlorinating water pumped into large tanks for the use of the general public at Kumasi worked satisfactorily during the year but a pipe-borne supply is urgently needed.

It is hoped that the pipe-borne supply at Cape Coast will be in use in September, 1928.

Koforidua, with a large European and a fair sized African population, is still without a satisfactory supply.

Tamale suffered from a shortage of water during 1927-28, and special boring plant had to be obtained from England.

### (e) OFFENSIVE TRADES.

The nuisance arising from fish-curing in congested urban areas was met to a certain extent by enforcing local byelaws relating thereto.

The curing of hides was found to give rise to a nuisance in certain areas, *e.g.*, Kumasi ; but adequate steps were taken without recourse to legal measures.

### (f) CLEARANCE OF BUSH AND UNDERGROWTH.

This is carried out periodically.

### (g) SANITARY INSPECTIONS AND PROSECUTIONS.

Details of the above for five of the principal towns are given in Sanitary Form No. 7 which is included in the appendix. House-to-house inspections numbered 632,847 as compared with 620,351 in the previous yearly period.

The larval indexes in Accra, Kumasi, Cape Coast, Sekondi and Koforidua were 0.6, 0.92, 1.04, 0.58 and 0.91 respectively. 5,326 prosecutions resulted in £3,378 5s. being received in fines.

## III.—SCHOOL HYGIENE.

Recent legislation has had the effect of closing a number of premises which had been used hitherto as schools to the detriment of the health of the scholars attending the same. An important step was taken by the Education Department during the period under review in drawing up with the co-operation of this Department rules relating to dormitories, dining-halls, etc. After careful consideration it was decided to insist on a minimum of 480 cubic feet of air space per scholar in dormitories. Periodical examinations of children attending the schools in Accra, Sekondi, Kumasi and Tamale were carried out during the year by the Medical Officers in charge of welfare clinics and centres.

In order that the results of such examinations should possess a greater degree of uniformity and so be of more value for comparative purposes since the personal factor would be reduced considerably, a system of card record was introduced during the year.

This system was based on a similar one in use in England. Owing to lack of continuity in the various centres resulting from short tours, a standard form of medical examination was considered highly desirable.

It is noteworthy that the welfare clinics have increased enormously in popularity during the last year or so, and in consequence a Medical Officer is compelled to devote so much time to infants and expectant mothers that the section of the work connected with the routine examination of school children and the following up of cases in which remediable defects were discovered at the examination has had to be neglected to some extent. The possibility of establishing a school medical service will have to be considered at no distant date. Details of examination at various school centres are given hereunder.

TABLE VII.

Return of school children examined during the year ending 31st March, 1928, in Accra.

Number examined—1,470. Number found defective—902.

## SUMMARY OF DEFECTS.

Male.	Female.	Spleen.	Heart.	Lungs.	Debility.	Skin.	Mouth and Teeth.	Throat and Tonsils.	Ears.	Eyes.	Glands.	Nervous System.	Deformities.	Yaws.	Unvaccinated.	Dwarf.
1099	371	507	4	23	1	63	250	510	5	32	165	—	10	7	360	1

The total attendances of school children at the Christiansborg School Clinic during the year numbered 1,139 being composed of 393 new and 355 old cases.

The conditions treated included malaria, constipation, enteritis, septic wounds and ulcers, bronchitis, chronic otitis media, conjunctivitis, mumps, measles, toothache, pharyngitis and torticollis. Trachoma and yaws were comparatively rare in school children.

Malaria was by far the commonest disease and the figure for enlargement of spleen given in Table VII supports this statement. Enlarged tonsils would appear to be a common condition in school children; but tonsillitis is rare and chorea and heart lesions are very rare, consequently it is doubtful if the enlargement has much significance from a health standpoint.



TABLE VIII.

Return of school children examined during the period July, 1927—March, 1928, at Kumasi.

Number examined—853.

## SUMMARY OF DEFECTS.

Unvaccinated.	Yaws.	Deformities.	Nervous System.	Glands.*	Eyes.	Ear.	Throat and Tonsils.	Mouth and Teeth.	Skin.	Debility.	Lungs.	Heart.	Spleen.	No. of Scholars.
392	32	8	—	1,513	20	—	205	264	81	18	10	4	496	853

\*One or more groups of glands in the same child.

The clinic at Kumasi was opened in temporary premises in July, 1927, and it is hoped that the permanent welfare centre will have been built by the end of July, 1928.

TABLE IX.

Return of school children examined during the year ending the 31st of March, 1928, at Sekondi.

Number examined—588.

## SUMMARY OF DEFECTS.

Unvaccinated.	Yaws.	Deformities.	Nervous System.	Glands.	Eyes.	Ears.	Throat and Tonsils.	Mouth and Teeth.	Skin.	Debility.	Lungs.	Heart.	Spleen.	No. of Scholars.
225	8	—	—	214	15	1	7	160	93	6	29	3	143	588

Attendances of school children at the Sekondi clinic during the year amounted to 1,382.

Schools in all the larger centres are subjected to periodical inspections by health officers.

## IV.—LABOUR CONDITIONS.

A decreasing amount of indentured labour is employed on the Gold Coast.

This applies to mining corporations as well as to municipal bodies and it is interesting to note that all the labour employed by the largest mining company on the Gold Coast—the Ashanti Goldfields Corporation—is non-indentured.

It has been found from experience that day labour is more easily handled than indentured Kroo labour for conservancy work in towns. Immigrant labourers continue to be medically examined and some 504 were dealt with in the quarantine station on the Accra beach during the period.

## V.—HOUSING AND TOWN PLANNING.

New building regulations were drawn up during the year under report and it is anticipated that these will have the force of law early in 1928-29.

Owing to certain legal delays and to the shortage of staff little progress was made in connection with the Town Planning Ordinance, No. 20 of 1925.

A number of layouts were approved but it not infrequently happens that staff is not available to demarcate such layouts and to control building thereon when demarcated.

Good work continues to be done by the staff of village overseers particularly in Ashanti.

An important principle was established with regard to the size of residential plots which are not to be less than 4,800 square feet in superficial area and not more than two-thirds of a plot is to be covered with buildings.

## VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

One of the most striking changes resulting from the rapid development of trade and transport facilities lies in the altered diet of a large section of the people.

Tinned foods of various descriptions are being used more and more in lieu of local foodstuffs.

In spite of this, however, deficiency diseases are negligible both in numbers and in degree of severity.

Among 1,233 deaths recorded in Accra, for example, during the year, there was only one from beri-beri and a doubtful fatal case of rickets.

Instances are reported from time to time of death from starvation, but these are rare and there is usually some other factor involved for example, chronic ulceration, ankylostomiasis, trypanosomiasis, etc. There is little difficulty in obtaining a well-balanced diet with all the necessary food elements. Complaints were received during the year that prisoners in the prison at Tamale were receiving too small a ration. On investigation, it was satisfactorily established that the ration as laid down in the prison dietary was adequate from the calorific point of view, well-balanced and contained the necessary accessory food factors.

A larger imprest was granted so as to enable the local prison authorities to make provision in case of temporary shortages.

The dietary for children at Achimota also came under review during the year, and a slight modification was suggested and given effect to as regards balancing of the elements.

## INSPECTION AND CONTROL OF MARKETS, ETC.

In the interests of the general public, the construction of markets—whether in concrete, as in the larger townships, or with bush-sticks and thatch or corrugated iron in villages—receives the warm encouragement of the health authorities as affording a ready means not only of ensuring that food is sold under the best possible conditions but of facilitating inspection and thereby ensuring good quality.

A new market was constructed at Christiansborg and another at Yensua, Sekondi.

Extensions were made to the markets in Accra and Kumasi. Steps were taken to level the site for a much needed new market at Winneba and plans were approved of a new market at Cape Coast. In addition, several small village markets were established, notably in Ashanti.

Markets are inspected periodically by Health Officers and Sanitary Inspectors and it is rarely that articles of food have to be seized.

In a small number of cases the food exposed consists of blown or damaged tins. The original local vendor is sought out and given an opportunity to surrender any damaged tinned stuffs in his warehouse or store.

Prosecutions for the sale or exposure for sale of unwholesome food numbered 99 during the year and resulted in £98 5s. being collected in fines.

A new slaughter house was opened at Cape Coast during the year, and a second at Mampong in Ashanti.

Slaughter-houses and, in smaller localities, slaughter-slabs are being constructed in various parts of the Colony, as and when funds are available.



There are still many townships where cattle have to be slaughtered and cut up in the open. This is unsatisfactory and it is to be hoped that funds will be available for improved conditions before long.

Public slaughterhouses are subjected to frequent inspections by the Health Authorities or Sanitary Inspectors.

The control of bakeries is a matter of some concern to the Health Authorities but there can be no doubt that conditions are rapidly improving in this direction.

This improvement has been hastened in Accra by the installation of a high class electric bakery with European bakers in charge. This has strengthened the hands of the Health Authorities who have, thus, been placed in a more satisfactory position to enforce the by-laws concerning bakeries passed some five years ago since the raising of the standard of hygiene in small private bakeries has not interfered with the general local supply.

In certain of the larger towns where there are no special by-laws relating to bakeries, action is taken under section 27, sub-section 5, of the Towns and Public Health Ordinance to improve conditions under which bread is prepared.

Aerated water factories exist in some of the larger towns in the Gold Coast, *e.g.*, Accra (4), Sekondi (2), and Kumasi (1). They are inspected from time to time to ensure a satisfactory standard of cleanliness and samples of aerated water are examined bacteriologically.

Inadequate European supervision is the drawback in some cases and, at times, large quantities of newly-made soda water have had to be condemned by the Health Authorities and destroyed.

Bye-laws regulating these factories are in force in some towns.

#### B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE.

Various methods are employed in spreading the knowledge of hygiene. The importance of hygiene is brought to the notice of the general public by means of "Health Days" and "Health Weeks." Monthly "Health Days" were inaugurated in Accra during the outbreak of yellow fever in order to multiply the stimuli resulting from annual "Health Weeks" and to bring the subject before the general population more frequently.

Reporting on this, the Medical Officer of Health, Accra, states as follows:—

"The children from the various schools are paraded with the masters and a district allotted to groups under a Sanitary Inspector.

"All houses and compounds in each area are visited and rubbish, tins, bottles, etc., are collected and placed in the nearest dustbins to be collected by the dustcarts.

"There is usually an increase of 50 tons in the rubbish collected for the day.

"The children thus learn practically how to keep houses and compounds clean."

Successful "Health Weeks" were held at Cape Coast, Koforidua, Dunkwa, Ada, and Tamale.

In addition, knowledge of hygiene is inculcated by daily house-to-house inspections, the latter being reinforced by legal measures if suasion fails.

Domiciliary visits are also carried out by African and European voluntary workers in connection with the Gold Coast League for Maternity and Child Welfare. These ladies extend the influence and teaching of the welfare clinic.

The teaching of hygiene forms an important part of the curriculum of all Government and assisted schools.

#### C.—TRAINING OF SANITARY PERSONNEL.

Training of the Sanitary staff is carried out in all stations where there are Health Officers.

In addition, a three years' course of training is given at the school for Sanitary Inspectors in Accra where a special training officer is stationed.

Owing to the demands made for the services of Sanitary Inspectors from all parts of the Colony and to the incidence of leave in the permanent staff it is not always possible to allow Sanitary Inspectors-in-training to remain for the whole of their three years' course.

It is still found necessary to give Inspectors-in-Training a general training in English and mathematics before teaching physiology, biology, etc.

#### D.—RECOMMENDATIONS FOR FUTURE WORK.

In the report of 1926-27, recommendations were made with regard to the following :—

1. Pipe-borne water supply for Kumasi and Koforidua. Investigations are still in progress in regard to the Kumasi water supply and there is a possibility of the Owabisu which lies a few miles to the north-west of Kumasi being found to be a satisfactory source. While the temporary supply of chlorinated water from wells is satisfactory as far as it goes, there is a real and urgent need for an adequate pipe-borne supply. Investigations were carried out at Koforidua to secure an improved temporary supply but a town of that size makes an adequate pipe-borne supply imperative.

2. The initiation of water carriage systems for the removal of night soil at Accra and Sekondi is most desirable. At Accra, this has had to give way to the more immediate necessity for dealing with the Korle lagoon which at times becomes a serious nuisance. See 10 below.

3. The recommendations for an adequate Sanitary staff were sympathetically considered by Government, and the approval of the Secretary of State was obtained for increasing the staff of Medical Officers of Health and Superintending Sanitary Inspectors from 9 to 18 in the case of former and 12 to 25 in the case of the latter.

This should go a long way towards increasing the efficiency of the Sanitation Branch of the Medical Department.

4. A small increase has been made in the number of European and African building inspectors but the number is still quite inadequate to deal with rapid development all over the Colony.

5. A Committee was appointed to draw up plans for satisfactory types of bungalows for the European staff and the plans devised will be found to be a considerable advance on existing structures.

6. Insufficient regard is still paid to the necessity of Europeans residing in the reserved areas.

With the help of the yellow fever outbreaks in 1927, however, several firms were induced to obtain plots and erect bungalows away from the quarters of the town occupied by the indigenous inhabitants.

7. It was not considered possible at present to give effect to the recommendations relating to the segregation of Syrians.

8. A good deal of town-planning has been carried out at Kumasi and Accra. At Takoradi only, however, does provision exist for separate areas for the various classes of a mixed population.

9. The recommendation in last year's Report for the establishment of a small staff of African health visitors has been given effect to, Government having approved of four such posts being created.

10. Strong recommendations were submitted in a special report on the outbreak of yellow fever in Accra with regard to the canalising and pitching of the Korle lagoon. This is an urgent necessity. Levels were in process of being taken at the end of the year.

11. In the same report recommendations were made for the relief of congested areas.

W. G. WATT,  
*Acting Director of Sanitary Service.*



## IV.—PORT HEALTH WORK AND ADMINISTRATION.

A Port Health Officer was appointed for Takoradi in August, 1927, otherwise the health or medical officer of each port performs the necessary duties.

These duties include the examination of arrivals from infected ports, the routine medical inspection of immigrant labourers and the examination of all intending passengers from infected ports in this Colony.

## V.—MATERNITY AND CHILD WELFARE.

The table given below demonstrates the increasing popularity of welfare centres in the Gold Coast.

Attendances of school children are not included as information under this head has been given under "School Hygiene."

The new centre opened in temporary quarters at Kumasi pending the completion of permanent buildings was an instantaneous success.

Clinic.	Attendances of Children.		Attendances of Expectant Mothers. 1927-28.
	1926-27.	1927-28.	
Accra .. ..	12,278	15,752	588
Christiansborg .. ..	3,962	7,849	292
Sekondi .. ..	11,605	20,091	802
Chama .. ..	1,137	2,211	—
Kumasi* .. ..	—	15,846	328
Total ..	28,982	61,749	1,930

\*Opened in July, 1927.

During the year two Government nurse-midwives were employed in Accra and Christiansborg with a view to the introduction of improved midwifery practice into the homes. Local prejudice is still a serious stumbling-block but each nurse-midwife succeeded in delivering two women per month, and this, it is hoped, is the thin end of the wedge. Apart from actual deliveries both nurse-midwives conducted several puerperiums and carried out many house-to-house visits to help and advise women about themselves, their babies and their homes.

Ante-natal clinics were started at the various centres and the attendances of expectant mothers at these clinics numbered 1,930 during the period July, 1927, to March, 1928. Untrained midwives were encouraged to bring to the clinics the expectant mothers who had retained their services so that the latter could be examined to ensure that conditions for an unaided birth were satisfactory and that no disorders of pregnancy were present.

Practical demonstrations were given to the untrained midwives whenever possible.

To assist in the campaign against maternal and infant mortality a voluntary organisation—the Gold Coast League for Maternity and Child Welfare—was started during the year with Lady Slater as President and Mesdames Thomas and Inness as Vice-Presidents.

Branches of the League were inaugurated at Accra, Sekondi, and Kumasi, and most praiseworthy work was done in the form of domiciliary visits paid by African and European ladies.

Extracts from reports of local Health Officers referring to this work are given hereunder.

## MEDICAL OFFICER OF HEALTH, ACCRA.

“ V. Visiting of houses by voluntary workers, both European and African ladies.

“ Much good work is being done by these ladies in seeking out cases of sickness especially amongst children and in having these cases sent to hospital for treatment, in having friendly talks with the native women and explaining to them the benefits of cleanliness, both personal and domestic, and the danger of insanitary conditions in their houses.”

## MEDICAL OFFICER, CHRISTIANSBORG CLINIC.

“ Great praise is due to the Lady Health Visitors who carry on extremely useful propaganda work in their several districts . . . . .

“ By their knowledge of the people and districts many cases of both expectant mothers and sick children are brought to the notice of the Medical Officer where otherwise they might never have been seen.”

## VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINIC.

The following Table shews the numbers of in-patients treated at Accra, Sekondi and Kumasi Hospitals respectively :—

Station.	1925-26.		1926-27.		1927-28.	
	European.	African.	European.	African.	European.	African.
Accra ..	258	2,372	294	2,640	286	2,724
Sekondi ..	228	820	172	885	224	794
Kumasi ..	140	2,400	140	1,953	151	2,412
Totals ..	626	5,592	606	5,478	661	5,930

## THE COST PER HEAD PER DIEM.

The average daily cost per patient for the principal hospitals of the Colony is shewn below.

These costs have been based on the expenditure for diets and provisions, fuel and light, medical comforts and kitchen staff only.

## EUROPEAN HOSPITALS.

(Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim) s. d.  
Average cost ... .. 6 4.68.

## AFRICAN HOSPITALS.

(Gold Coast Hospital, Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim, Saltpond) d.  
Average cost ... .. 10.09.

## AFRICAN HOSPITALS.

## ACCRA.

The Gold Coast Hospital, Accra, continues its excellent work amongst the African population.

## STATISTICS.

	1926-27.	1927-28.
Out-patients—Total .. .. .	11,283	11,040
In-patients—Total .. .. .	2,640	2,724
Surgical operations, Major .. .. .	740	644
Surgical operations, Minor .. .. .	192	364
Average daily number in hospital .. .. .	200	207



Its educational function of training dispensers and nurses for out-stations is also fully maintained.

#### ODA.

Owing to unavoidable delay the new hospital with 20 beds which it was expected would be completed in September, 1927, was not quite completed at the end of March, 1928.

#### WIOSO.

At Wioso a dispensary and operating theatre were practically completed during the year and the erection of a new standard type hospital with four beds was being proceeded with at the end of the year.

#### MATERNITY HOSPITAL, ACCRA.

Skilled attention in child-birth is one of the urgent needs of the Colony everywhere, and a great advance towards meeting this need has been made during the year in the completion of a new fully equipped Maternity Hospital at Accra. It is provided with 15 beds and 14 cots, nursing sister's quarters, quarters for a resident lady medical officer, etc.

Accommodation is now provided for women whose home conditions may be unsuitable for child-birth or for whom skilled assistance is necessary in order to produce a live child and an undamaged mother.

Not only this but, what is more important, it will serve also as a training ground for midwives, who, after their course of training, will be equipped to practise their profession in all the more important towns in the Colony.

It is certain that in the war against ignorance and prejudice this institution will prove of great and lasting worth.

Moreover, if the proposed West African Medical College is eventually established at Accra this Maternity Hospital will form a useful portion of the teaching unit.

#### KUMASI.

At Kumasi several important works under the Ashanti hospitals improvement programme took place. Two large blocks of African staff quarters with good accommodation for 14 subordinates, kitchens, bath-houses, etc., were completed; also a large two-storied building consisting on the ground floor of a European nurses' office and bedding store and on the upper floor of lecture rooms. In addition several other minor works were completed.

#### KINTAMPO, BEKWAI AND TARKWA.

At Kintampo a new ward with annexes and an operating theatre was erected. New mortuaries were completed at Bekwai and Tarkwa.

#### SANITATION BRANCH.

In the list of new buildings it should be mentioned that at Koforidua the Sanitation Branch was allocated a portion of a large two-storied building in ferro-concrete, containing offices for the Medical Officer of Health and staff and a sanitary store. These were completed in January, 1928.

At Kumasi the building of a new Infant Welfare Clinic was commenced in December, 1927.

Progress in Infant Welfare work is so rapid that it was found necessary during the year to attach a European Nursing Sister to the Princess Marie Louise Children's Hospital, Accra.

#### TRAVELLING DISPENSARY.

A new departure was inaugurated when, on the 26th February, 1927, a fully-equipped travelling dispensary in charge of a medical officer was despatched from Kumasi to the Northern Territories to work among the villages. The results, as was anticipated, have been so immediate and encouraging that Government will be asked to grant provision for several more.

In Appendix A will be found a list shewing all the Hospitals and Dispensaries in the Colony and Mandated Territory of Togo including the Infant Welfare Centres and Contagious Diseases Hospitals administered by the Sanitation Branch.

Tables V and VI give the summaries of in and out-patients treated under the Medical Branch during the year.

The Venereal Clinic figures are included in the out-patient table.

It is proposed in future reports to include in these tables all cases of whatever nature treated by both the Medical and Sanitation Branches if treated in a hospital or dispensary of either branch.

REPORT ON THE WORK OF THE X-RAY DEPARTMENT DURING  
THE YEAR 1ST APRIL, 1927, TO 31ST MARCH, 1928.

During the year under report the Radiographer, Mr. D. H. Brayne, carried out the work of the department until the 3rd August, 1927. Mr. A. Buckner, M.S.R., Assistant Radiographer, took over the work of the department from that date until the 15th February, 1928, when Mr. G. MacLardie, M.S.R., Radiographer arrived from England.

The electrical supply is fully adequate for the work demanded. The X-ray plant has been tested and found to be in accordance with the Natural Physical Laboratory standards as laid down under the official protective scheme.

New coronaless ærials have been installed together with a proper concrete base for the motor generator. A wooden protective case has also been installed to enclose the high tension wiring and rectifying disc as an electrical safeguard.

The total number of cases dealt with during the year was 1,141, an increase of 127 over the previous 12 months and they are classified as under :—

Examination of Bones	...	...	...	...	...	...	721
Examination of Spine	...	...	...	...	...	...	57
Examination of Skull	...	...	...	...	...	...	66
Examination of Chest	...	...	...	...	...	...	141
Examination of Opaque Meals	...	...	...	...	...	...	49
Examination of Abdominal cases		...	...	...	...	...	7
Examination of Gunshot wounds		...	...	...	...	...	3
Examination of Kidneys	...	...	...	...	...	...	21
Examination of Aneurysm	...	...	...	...	...	...	2
Examination of Heart cases		...	...	...	...	...	4
Examination of Dental cases	...	...	...	...	...	...	46
Examination of Urinary Tract	...	...	...	...	...	...	9
Examination of Foreign Bodies	...	...	...	...	...	...	11
Opaque Enemas	...	...	...	...	...	...	2
Localisation of Foreign Bodies	...	...	...	...	...	...	2
Total	...	...					1,141

Sixteen treatments of X-ray therapy were given during the year.

REPORT OF THE WORK IN THE ELECTRO-THERAPEUTICAL  
DEPARTMENT DURING THE YEAR FROM 1ST APRIL, 1927 TO  
31ST MARCH, 1928.

The following treatments were carried out in the Electro-therapeutic Department :—

Galvanism	...	...	...	...	...	...	245
Massage	...	...	..	...	...	...	1,585
Radiant Heat	...	...	..	...	...	...	1,030
X-ray Therapy	...	...	...	...	...	...	17
Diathermy	...	...	...	...	...	...	300
							<hr/>
							3,177



Total treatments number 3,177, an increase of 1,143 over the previous year.

#### VENEREAL CLINIC, ACCRA.—YEAR 1927-28.

The new Venereal Disease Clinic which was opened in February, 1927, has the following accommodation :—

- A Waiting room.
- A Consulting room.
- A Special examination room.
- 4 Single irrigating cubicles.
- 4 Combined examination and irrigating cubicles.
- General services room.

The present staff consists of :—

- 1 Temporary Medical Officer-in-Charge.
- 2 Male Nurses.
- 1 Female Nurse.
- 1 Labourer.

Extra labour is obtained as required.

The Medical Officer-in-Charge, Dr. Reindorf, was on leave of absence from the 27th August, 1927, to the 12th March, 1928. His duties were carried on satisfactorily during his absence.

With a view to simplifying administrative procedure the control of the Venereal Clinic was placed in the hands of the Resident Medical Officer, Gold Coast Hospital, at the beginning of the second quarter of the year under review.

#### ATTENDANCES.

	1926-27.	1927-28.
Patients treated (old and new cases) .. .. .	4,496	4,244
Gonorrhoea .. .. .	1,623	562
Chancroid .. .. .	115	22
Syphilis .. .. .	367	337
Framboesia .. .. .	259	882
N.A.B. injections .. .. .	6,409	2,927
Mercury .. .. .	1,066	—
Bismuth .. .. .	6,272	5,924

A decline in all forms of venereal disease is shown more particularly in gonorrhœa cases in women, and an increase in yaws cases appears.

The question of whether yaws cases should be allowed to come to the venereal clinic or directed to the Gold Coast Hospital for treatment is somewhat difficult. On the whole it seems better for the present to allow them to come to the venereal clinic if they wish, as by this method it is believed that genuine venereal cases will be attracted to the clinic.

Below is shown a detailed return of all cases treated during the year :—

RETURN SHOWING NUMBER OF CASES TREATED IN THE VENEREAL CLINIC FOR THE YEAR 1927-28 AND CONDITIONS  
OTHER THAN VENEREAL, INCLUDING YAWS, ETC.

	Primary Syphilis.		Secondary Syphilis.		Tertiary Syphilis.		Congenital Syphilis.		Soft Chancre.		Gonorrhoea.		Conditions other than Venereal, including Yaws.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
I. Remaining under treatment 1st April, 1927 .. ..	253	8	91	158	173	219	—	—	—	—	233	891	302	113	1,052	1,389
II. New Cases .. ..	44	3	50	31	79	130	—	—	22	—	414	148	341	541	950	853
(a) Complete I full Course ..	16	2	9	7	12	13	—	—	—	—	—	—	31	41	68	63
(b) Complete II Course ..	2	—	2	—	3	5	—	—	—	—	—	—	7	5	14	10
(c) The full Course ..	—	—	—	—	—	—	—	—	—	—	144	53	—	—	144	53
(d) The full Course with final test .. ..	—	—	—	—	—	—	—	—	—	—	74	—	—	—	74	—
(e) Ceased to attend before completion of full Course ..	66	5	42	30	55	94	—	—	—	—	398	219	307	409	868	757
III. Discharged after completion of Course .. ..	2	—	2	—	3	5	—	—	—	—	74	—	7	5	88	10
IV. Remaining under treatment 1st April, 1928 .. ..	213	4	88	152	182	237	—	—	—	—	31	767	298	199	812	1,359



## REPORT ON THE WORK OF THE DENTAL CENTRES DURING THE YEAR.

Work has been carried out at the following centres:—Accra, Kumasi and Tamale.

Mr. W. H. Donald, Dental Surgeon, proceeded on leave on the 4th June, 1927, and resumed duty on the 11th October, 1927.

Mr. J. Campbell, a newly appointed Dental Surgeon, arrived in the Colony on the 17th November, 1927, and assumed duty at Kumasi.

The following statement will show the numbers of patients of all classes treated, the numbers and nature of the treatments given, and the chief pathological conditions that were dealt with during the period.

A.—Classification of the total patients treated with the figures for 1926-27 for comparison:—

	1926-27.	1927-28.
Officials (European) .. ..	698	762
Officials (African) .. ..	872	819
Total officials ..	1,570	1,581
Non-officials (European) .. ..	559	708
Non-officials (African) .. ..	1,449	1,506
Total non-officials ..	2,008	2,214
Total treated (in all classes) ..	3,578	3,795

The figures for 1926-27, show an increase of 32.25 per cent over the previous year. Those for 1927-28 show an increase of 6.07 per cent of those for 1926-27.

B.—Number and nature of treatments carried out:—

	Officials.	Non-Officials.	Total.
(a) Extractions.			
Local anaesthesia .. ..	756	1,993	2,831
General anaesthesia .. ..	28	54	—
(b) Fillings.			
Gold .. ..	24	17	41
Amalgam .. ..	214	273	487
Porcelain .. ..	136	167	303
Cement .. ..	75	43	118
Temporary .. ..	183	208	391
(c) Dressings.			
Including root treatment .. ..	361	412	773
(d) Scalings .. ..	187	199	386
(e) Bridges, crowns and other restorations ..	9	18	27
(f) Dentures .. ..	78	154	232
(g) Repairs to bridges, dentures, .. ..	68	104	172
(h) Minor treatments .. ..	98	179	277

C.—The chief pathological conditions met with during the period were as follows :—

(1)	Dental caries	..	..	..	..	..	..	2,375
(2)	Dental abscess	..	..	..	..	..	..	803
(3)	Pulpitis acute and chronic	..	..	..	..	..	..	372
(4)	Periodontitis acute and chronic	..	..	..	..	..	..	407
(5)	Excessive calcific deposit	..	..	..	..	..	..	495
(6)	Cases diagnosed as true pyrrhoea alveolaris	..	..	..	..	..	..	418
(7)	Gingivitis	..	..	..	..	..	..	453
(8)	Septic roots	..	..	..	..	..	..	375
(9)	Stomatitis	..	..	..	..	..	..	154
(10)	Sepsis arising in connection with eruption of permanent dentition							105
(11)	Malposition of the teeth	..	..	..	..	..	..	32
(12)	Fracture of teeth	..	..	..	..	..	..	25
(13)	Necrosis of Alveolus	..	..	..	..	..	..	31
(14)	Neuralgia of non-dental origin	..	..	..	..	..	..	8
(15)	Polypus of pulp	..	..	..	..	..	..	35
(16)	Pulp stones	..	..	..	..	..	..	18
(17)	Excessive post-extraction haemorrhage	..	..	..	..	..	..	11
(18)	Supernumerary teeth	..	..	..	..	..	..	38
(19)	Dental cyst	..	..	..	..	..	..	4
(20)	Epulis	..	..	..	..	..	..	2
(21)	Fibrous Sarcoma of jaw	..	..	..	..	..	..	6
(22)	Antral disease	..	..	..	..	..	..	1
(23)	Cancrum oris	..	..	..	..	..	..	3
(24)	Odontomes	..	..	..	..	..	..	2
(25)	Perforation of the palate with supply of obturator	..	..					2

The prosthetic work of the department has been satisfactorily performed by Mr. L. Minto, Dental Mechanic.

W. H. DONALD,  
*Government Dental Surgeon.*

## VII.—PRISONS AND ASYLUMS.

### PRISONS.

The prisons of the Gold Coast administered by the Prison Department are as follows :—

A.	Convict Prisons	...	...	4
B.	Local Prisons	...	...	24

The Convict Prisons are situated at Accra (Ussher Fort), Sekondi (Central), Kumasi and Tamale.

A new block of 36 cells—average capacity 900 cubic feet—was constructed during the year at Ussher Fort.

The local Prisons are as follows and are constructed as shown below :—

Converted Forts of solid masonry: Accra James Fort; Elmina; Cape Coast; Sekondi (Fort Orange); Axim; Keta.

Brick: Tarkwa; Kintampo.

Stone: Akuse; Ho; Salaga.

“Swish”: Bole; Obuasi; Winneba; Sunyani; Kpando; Gambaga; Zuaragu; Bawku; Navrongo; Lawra; Wa; Yendi; Krachi.

*General Health.*—Good throughout the year. The general appearance of the prisoners was satisfactory.

*Female Accommodation.*—There is separate accommodation for females at Accra, Elmina, Kumasi and Keta.

The daily average of female prisoners for the year was 31.39.



*Type of cells.*—In all prisons, prisoners sleep in association cells. In the more modern prisons, the cells are mostly smaller accommodating three prisoners each. This refers more particularly to the four convict prisons whilst cells at all local prisons are for the most part large cells accommodating from 10 to 30 prisoners. There are no single cells except for punishment segregation.

*Employment.*—At Accra, Sekondi, Kumasi and Tamale, long-sentence prisoners are employed chiefly in the workshops or on reconstruction work. Short sentence prisoners are employed on farming or sanitary work. The hours of labour are from 6.0 a.m. to 11 a.m., and from 12.30 p.m. to 3.30 p.m. Except in the case of particularly dangerous prisoners, of whom there are very few, no prisoners are required to work in their cells.

*Diet.*—For the diet scale see appendix to this report. Rations are adequate and of good quality. No illnesses due to food occurred.

*Lock-up.*—The average daily lock-up was 1,701.74 as compared with 1,620.25 in 1926-27.

*Isolation for Phthisis.*—Special accommodation exists at Elmina for phthisical cases. At Tarkwa also where an occasional case of phthisis occurs satisfactory local arrangements are made.

*Sanitation.*—Satisfactory arrangements exist in all prisons.

*Outbreaks.*—Two small outbreaks of a mild form of chicken-pox occurred during the year, one at Kumasi and the other at Cape Coast.

*Complaints.*—No complaints of importance were made to the Director or visitors during the year.

*Alterations to Buildings.*—No major alterations.

*Recommendations.*—For the future any new prison built should have individual cells, and not association cells, in order to bring it into line with modern ideas of prison construction.

*Average Daily Lock-up.*

1924-25	..	..	..	..	..	1,390.57
1925-26	..	..	..	..	..	1,433.25
1926-27	..	..	..	..	..	1,620.25
1927-28	..	..	..	..	..	1,701.74

*Sick List (average).*

1924-25	..	..	..	..	..	3%
1925-26	..	..	..	..	..	3.1%
1926-27	..	..	..	..	..	3.99%
1927-28	..	..	..	..	..	3.22%

Death-Rate.							Total.	Per cent average daily Lock-up.
1924-25	..	..	..	..	..	..	18	1.29 %
1925-26	..	..	..	..	..	..	35	1.29 %
1926-27	..	..	..	..	..	..	30	1.85 %
1927-28	..	..	..	..	..	..	53	3.11 %

# APPENDIX TO REPORT ON PRISONS.

## SCALE OF DIET.

No. I.	No. II.	No. III.		Punishment.	European.	West Indian.	Infirmary.	
		5 days a week.	2 days a week.				Full.	Low.
*Kenki .. 2 lbs. { Fish, fresh cooked 2 ozs. or Fish, salt cooked 3 ozs. or Beef, fresh cooked 1 oz. or Beef salt cooked 1½ ozs. or Pepper ⅓ oz. Salt .. ¼ oz.	Kenki 2½ lbs. { Fish fresh cooked 3 ozs. or Fish salt cooked 4 ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked 2 ozs. Pepper .. ⅓ oz. Salt .. ¼ oz.	Kenki .. 2½ lbs. { Fish fresh cooked 4½ ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked 2½ ozs. Pepper .. ⅓ oz. Salt .. ¼ oz.	Boiled Cassada 2½ lbs. { Fish fresh cooked 3 ozs. or Fish salt cooked 4½ ozs. or Beef fresh cooked 1½ ozs. or Beef salt cooked 2½ ozs. Pepper .. ⅓ oz. Salt .. ¼ oz. Palm Oil .. ½ oz. Vegetables .. 4 oz.  The above articles of diet excepting the boiled cassada are to be made into soup.	No. I.  Kenki .. 1½ lbs. Salt .. ¼ oz.  No. II.  Kenki .. 1 lb. Salt .. ¼ oz.	<i>Per diem.</i> Rice .. 1½ lb. Bread .. 1½ lb. Fresh Beef cooked or Fowl cooked 1 lb.  <i>or 3 days a week.</i>  Fresh fish cooked .. ½ lb. or Fresh Beef cooked 1 lb. or Fowl cooked 1 lb.  <i>Per week.</i> Tea .. ¼ lb. Sugar ½ lb.	Same diet as First and Second Class, except that the Kenki or Cassada shall be reduced by ½ lb. in respect of which reduction Rice ½ lb. or Agidi ½ lb. is to be substituted.	Kenki .. 2 lbs. or Rice cooked 1 lb. or Cassada cooked 3 lbs. Fish fresh cooked 4 ozs. or Fish salt cooked 6 ozs. or Beef fresh cooked 2 ozs. or Beef salt cooked 2 ozs. Pepper ⅓ oz. Salt .. ¼ oz. Vegetables 3 ozs. †Akassa 10 ozs.	Kenki .. 2 lbs. or Rice cooked ¾ lb. or Cassada cooked 2½ lbs. Fish salt cooked 4 ozs. or Beef fresh cooked 1½ oz. or Beef salt cooked 1½ ozs. Pepper ⅓ oz. Salt .. ¼ oz. Vegetables 3 ozs. †Akassa 10 ozs.

All Native Prisoners are allowed 10 ozs. of boiled Akassa every morning, except when on No. 2.

1. Prisoners sentenced to 7 days and under, No. 1 diet, without fish or meat.

2. " " " to more than 7 days and not more than one month, No. 1 diet.

3. " " " 1 month and not more than six months, No. II diet.

4. " " " 6 months No. III. diet.

5. In case of Kroo men Rice to be substituted for Kenki at the following rate :—No. I, ¾ lb.; No. II, 1 lb.

\*Kenki consists of maize soaked in water, mashed and cooked.

†Akassa—a gruel made of maize.

No. III. 1 lb.; Punishment ¾ lb.; Infirmary, Full, 1 lb.; Low, ¾ lb.

Punishment diet, to be taken before the day's work is begun.



## CENTRAL ASYLUM, ACCRA.

The staff of the Central Asylum, Accra, during the year consisted of the following :—

1	Chief Attendant.
1	Assistant Chief Attendant.
17	Male Attendants.
3	Female Attendants.
1	Matron.
1	Gate-keeper.

There is no other asylum.

On the 31st March, 1928, there was a total of 241 inmates as compared with a total of 244 at the end of March, 1927—a slight decrease. The corresponding figure at the end of March, 1926, was 229.

Statistics for the year are shown below :—

Admitted during the year	...	...	...	...	88
Discharged during the year	...	...	...	...	28
Escaped during the year	...	...	...	...	1 (Male).
Deaths during the year	...	...	...	...	62

Number of inmates remaining on the 31st March, 1928 :—

Males	...	...	...	...	162
Females	...	...	...	...	43
Criminal lunatics	...	...	...	...	36 (all males).
Total	...	...	...	...	241

Deaths to the number of 62 were recorded as follows :—

Debility and exhaustion	...	...	...	...	3
Diarrhœa and exhaustion	...	...	...	...	1
Epilepsy	...	...	...	...	9
Mitral regurgitation	...	...	...	...	3
Chronic bronchitis	...	...	...	...	1
Heart failure	...	...	...	...	18
Bacillary dysentery	...	...	...	...	2
Dysentery and exhaustion	...	...	...	...	1
General debility	...	...	...	...	1
Paraplegia and exhaustion	...	...	...	...	1
Asthenia and debility	...	...	...	...	1
Pulmonary tuberculosis	...	...	...	...	6
Hæmorrhage from gastric ulcer	...	...	...	...	1
Wasting	...	...	...	...	6
Enbolism	...	...	...	...	1
Septicæmia	...	...	...	...	1
Suicidal hanging	...	...	...	...	1
Aortic regurgitation	...	...	...	...	1
Ankylostomiasis	...	...	...	...	2
Senile decay	...	...	...	...	2
Total	...	...	...	...	62

The somewhat high mortality from wasting and general debility was partly due to the eating of filth by patients and also in many cases to their refusal of food and medicine.

The mental diseases from which the inmates suffered were as follows:

	Males.	Females.
Imbecility .. .. .	33	3
Mania .. .. .	68	15
Homicidal mania .. .. .	23	—
Melancholia .. .. .	8	1
Suicidal mania .. .. .	5	1
General Paralysis of the insane ..	1	—
Periodical Insanity .. .. .	2	1
Epilepsy .. .. .	2	2
Dementia .. .. .	8	6
Delusional Insanity .. .. .	21	6
Under observation .. .. .	27	8
Total .. .. .	198	43

Although as pointed out in previous reports, accommodation in the present asylum is not entirely satisfactory and facilities for treatment on modern lines are poor, the general health of the inmates was not unsatisfactory and no epidemic outbreak took place.

It was not found possible to commence the construction of a new mental hospital during the year, but various plans are being considered and a full scheme will be put forward in due course for inclusion in next estimates.

*Alienist Officer.*—It is considered that the appointment to the Colony of a Medical Officer with special knowledge of alienation is very desirable and the sanction of the Secretary of State for such appointment has been sought.

#### VIII.—METEOROLOGY. AVERAGE FIGURES FOR THE YEAR 1927-28.

Station.	Temperature.						Total Rain-fall.	De-gree of	Wind.	
	Solar Max.	Min. on Grass.	Shade Max.	Shade Min	Range	Mean.	Amnt. in Inch.	Hum.	Gen. Dir.	Av. Frce.
Accra ..	145.6	65.7	84.7	74.3	16.6	79.5	22.23	74.3	S.W.	4.7
Kumasi	137.0	64.6	87.9	69.2	25.3	78.6	63.72	82.8	S.W.	.73
Sekondi	137.1	71.7	85.3	73.2	19.3	79.7	42.72	81.1	S.	1.8
Tamale ..	155.1	48.6	93.9	65.6	36.7	78.7	41.06	61.9	S.W.	4.1

The above figures have been supplied by the Director of Agriculture who is in charge of all the observing stations.

#### METEREOLOGICAL OBSERVATIONS. LABORATORY GROUNDS, KORLEY BU, ACCRA.

Month.	Rainfall in inches.	Highest Maximum Temperature recorded.	Lowest Minimum Temperature recorded.	Daily average mean Temperature.	Temperature of the Highest set	Dewpoint Lowest.
April 1927 ..	2.15	87	69	81.25	77.4	70.9
May 1927 ..	6.67	87	76	81.36	77.00	71.3
June 1927 ..	1.71	84	74	78.87	75.00	69.9
July 1927 ..	0.26	82	73	77.67	76.00	65.5
August 1927 ..	0.25	84	72	76.00	72.9	66.1
September 1927	0.05	82	72	77.35	72.9	68.5
October 1927	1.08	87	74	79.66	73.3	68.9
November 1927	2.21	86	74	80.98	75.7	70.4
December 1927	3.52	87	74	81.43	76.7	68.7
January 1928	0.06	90	74	80.46	75.7	56.2
February 1928	—	89	68	80.65	75.7	48.4
March 1928 ..	3.44	87	71	81.68	76.3	68.7

Total Rainfall—21.40 inches.



## IX.—SCIENTIFIC.

(a) ANNUAL REPORT OF THE MEDICAL RESEARCH INSTITUTE, GOLD COAST,  
FROM 1ST APRIL, 1927, TO 31ST MARCH, 1928.

## STAFF.

During the year the staff was composed as follows :—

## EUROPEAN.

Director	.	..	..	Dr. W. A. Young
Pathologist	..	..	..	Dr. A. S. Burgess
Pathologist	..	..	..	Major C. M. Ingoldby, R.A.M.C. (died 22-6-27).
Pathologist	..	..	..	Dr. W. Thomson
Pathologist	..	..	..	Dr. G. Robinson
Pathologist	..	..	..	Dr. H. M. Russell
Medical Entomologist	..	..	..	Mr. A. W. J. Pomeroy
Laboratory Superintendent	..	..	..	Mr. F. Leeson
Laboratory Assistant	..	..	..	Mr. F. W. Abbott
Laboratory Assistant	..	..	..	Mr. S. F. Woodward.

## AFRICAN.

Laboratory Attendant	..	..	..	Mr. P. C. Paittoo
Laboratory Attendant	..	..	..	Mr. E. E. Bannerman
Laboratory Attendant	..	..	..	Mr. S. O. Nelson
Laboratory Attendant	..	..	..	Mr. J. S. Nettey
Laboratory Attendant	..	..	..	Mr. L. P. Gray
Laboratory Attendant	..	..	..	Mr. A. A. S. Williams
Laboratory Attendant	..	..	..	Mr. D. M. M. Akoto-Lampitey
Second Division Clerk	..	..	..	Mr. J. T. Marbell.

Labourers, mortuary attendant, messenger, driver, etc.

The Director was on duty until May 21st 1927, when he proceeded on leave. He returned on October 26th, 1927. During April, 1927, he visited Akuse, Sra, Somanya and Nsawam to investigate cases of yellow fever. On certain of these occasions he was accompanied by Dr. A. F. Mahaffy and Dr. J. H. Bauer of the West African Yellow Fever Commission of the Rockefeller Foundation and Dr. W. Thompson. After the arrival of Dr. Noguchi of the Rockefeller Foundation at the Laboratory on November 17th, 1927, the Director was particularly occupied with the histological study of material from yellow fever cases in conjunction with Dr. Noguchi.

Dr. A. S. Burgess acted as Director during Dr. Young's leave. On November 4th, 1927, he went to Sekondi to take charge of the Laboratory there. He remained at Sekondi until February 29th, 1928 and went on leave on the 10th March, 1928. He was awarded The Langley Memorial Prize for his work on "The Selection of a strain of *B. pestis* for the preparation of a vaccine, with special reference to the effect of animal passage on virulence."

Major Ingoldby, R.A.M.C., was in charge of the Laboratory at Sekondi until his death in June, 1927.

Dr. W. Thompson worked in Accra until the 8th of October, 1927, when he went on leave. On his return on February 28th, 1928, he took charge of the Sekondi Laboratory.

Dr. G. Robinson worked in Accra until June 27th, 1927, when he took charge of the Sekondi Laboratory. He remained on duty there until he went on leave on the 6th of November, 1927. He returned to duty in the Colony on the 6th of March, 1928 and proceeded to the Northern Territories on Trypanosomiasis investigation.

Dr. H. Russell was a new appointment. She arrived in the Colony on February 29th, 1928 and assumed duty at Accra.

Mr. A. W. J. Pomeroy, Medical Entomologist, returned from Northern Territories early in May, 1927 and went on leave on the 7th of the same month. He returned to Accra on November 23rd, 1927 and proceeded to Gambaga, Northern Territories on December 16th to continue investigation on the tsetse fly problem.

Mr. F. Leeson, Laboratory Superintendent, went on leave on the 21st of May, 1927.

Mr. F. W. Abbott, Laboratory Attendant, went on leave on June 5th, 1927. He returned to Accra on 17th November and proceeded to Bawku, Northern Territories, in December with Mr. Woodward and Mr. Nettey, and the Mobile Laboratory, to undertake cattle examination at the frontier.

Mr. S. F. Woodward, Laboratory Attendant, returned from leave to Accra on the 10th of May, 1927. In December he proceeded to Bawku. On March 30th, 1928 he was transferred to the Sekondi Laboratory.

Mr. P. C. Paittoo was on duty in Sekondi during the year.

Mr. E. E. Bannerman was on duty in Accra during the year.

Mr. S. O. Nelson was appointed in April, 1927 and has worked in Accra.

Messrs. Nettey, Gray, Willaims and Akoto-Lamptey have worked with the Entomologist during the year.

Mr. J. T. Marbell was on duty in Accra during the year.

## LABORATORIES.

### THE ACCRA LABORATORY.

A new plague house has been completed and will be invaluable for the future plague work; it stands apart from the main Laboratory building and animal houses.

The Laboratory was partly repainted during the year and the grounds have improved. A semicircular "tarmet" avenue has taken the place of the old entrance and this has relieved the congestion of cars which used to occur and has improved the approach to the building.

A "Frigidaire" motor was attached to the ice chest in January and is working satisfactorily.

### THE SEKONDI LABORATORY.

This was supplied with an acetylene gas plant which is working satisfactorily.

### LABORATORY AT KUMASI.

The construction of a Laboratory at Kumasi is being considered, and plans have been drawn for the buildings.

### THE MOBILE LABORATORY.

This continued to be of great use. It was used for three important investigations.

- (a) The yellow fever outbreak at Sra.
- (b) The yellow fever outbreak at Larteh.
- (c) The trypanosome infection rate of the cattle entering the Colony at the North East frontier.

### WEST AFRICAN YELLOW FEVER COMMISSION OF THE ROCKEFELLER FOUNDATION.

During the year the Institute has had the pleasure of co-operating with the following members of the Rockefeller Yellow Fever Commission all of whom have worked in connection with the Laboratory from time to time.

Professor Adrian Strokes who fell a victim to yellow fever while conducting investigations at Lagos and died on the 19th September, 1927.

Dr. Johannes H. Bauer.

Dr. A. M. Walcott.

Dr. A. F. Mahaffey.

Dr. G. H. Ramsey.

Dr. Henry Beeuwkes, the Director of the Commission, visited the Laboratory in September, 1927.

Dr. Noguchi arrived and commenced work in the Accra Laboratory on 17th November, 1927. Almost half of the Laboratory was placed at his disposal and most of the animal houses.



## REPORT OF ACCRA LABORATORY.

## YELLOW FEVER.

During Dr. Noguchi's visit the Director worked with him studying the histology of experimental fever in *Macacus rhesus*. Hundreds of these animals were examined and between January and March, 1928, over a thousand sections were examined. Investigations were proceeding at the end of the year under review and had not been completed.

## PLAGUE.

More than 10,000 doses of plague vaccine not more than 3 months old have been kept always on stock. Apparatus for rapidly increasing the supply of vaccine in emergency is now available.

Dr. Burgess continued his researches on plague vaccine during the year. The following is his report:—

*Work undertaken.*—The plague work carried out during the year consisted of vaccine tests on *C. gambianus*, a search for variants of *B. pestis* and a repetition of the experiments made last year, in which passage through partially immunized animals was found to cause loss of virulence. The work involved the inoculation of 527 *C. gambianus*, 45 *R. ratus* 35 guinea-pigs and 5 white rats. The white rats and some of the guinea-pigs were kindly supplied by the Rockefeller Commission.

*Virulence of the strains used.*—Contrary to the results of last year, it was found that all strains which has been in culture for six months or more had become much attenuated. A single passage, however, through *C. gambianus* restored virulence fully for this animal, considerably for *R. rattus*, but not appreciably for guinea-pigs. Guinea-pigs in fact could only be infected by very heavy intraperitoneal injections (e.g. 3000 million bacilli). Moreover it was found that the resulting culture was not more virulent than the infecting one, and all attempts to enhance virulence for guinea-pigs by successive passage failed. It would appear, therefore, that our cultures had become modified by frequent passage through *C. gambianus*, and were of more restricted virulence than strains causing human epidemics. It must be admitted, however, that the supply of guinea-pigs was small, and the scope of the experiments limited in consequence.

*Variants of B. Pestis.*—In the search for variants the appearance of colonies on agar was studied, and the salt stability of different strains estimated.

Distinct differences in the appearance of colonies were observed, but bore no relation to salt stability or virulence. As regards salt stability it was found that strains attenuated by long culture or by passage through vaccinated animals were slightly less stable than the rat-virulent ones. The former agglutinated in concentrations of 0.42 to 0.63 per cent, and the latter in concentration of about 0.84 per cent, *i.e.* in normal saline. It will be noted that none of these strains was thoroughly salt stable. As regards variants in general, salt stability is usually associated with virulence, and in this connection it may be recalled that the virulence of our so-called rat-virulent strains was not complete, but was limited to certain species of animal. Unfortunately there was no fresh human strain available for test.

*Attenuation by Passage.*—Of experiments planned to produce diminution of virulence by passage through vaccinated animals, two were successful, and confirmed the results obtained last year. In one, the killing time of a culture was increased from 59 hours, (8) to 230 hours, (16) by passage through a vaccinated *C. gambianus* which died 391 hours after the test dose, and in the other from 68 hours, (4) to 146 hours, (8) by passages through a vaccinated *C. gambianus* which died in 267 hours. The figures in brackets indicate the number of animals used in each test. The experiment is not easy, for unless the survival period is greatly prolonged, no attenuation occurs, and if protection is complete and the animal survives, no culture is obtained.

*Vaccine Tests.*—These gave varying results and on the whole were disappointing. Reviewing all the experiments in which *C. gambianus* received two doses (containing 0.75 and 1.5 of dried bacterial substance) of vaccine made from rat-

virulent culture, the following figures were obtained—71 vaccinated animals, and 28 unvaccinated ones (controls) received test doses of virulent culture. Of the former 18, *e.g.*, 25 per cent, survived, and of the controls all died in an average period of 63 hours.

The vaccine, therefore, did confer a certain amount of immunity on rats, but there is little reason to suppose that it would be equally efficient for human beings. It is an accepted rule, and one that is supported by our experiments, that vaccine must be made from virulent culture. As fresh human strains are virulent for guinea-pigs and our cultures were not, it may be inferred that our cultures were not virulent for human beings, and that vaccine made from them would be of little value. To maintain a stock of efficient vaccine therefore, when cases of plague are not available, it would appear necessary to obtain a fresh human strain from elsewhere at frequent intervals. This would be a difficult matter. In the event of an epidemic it is obvious that the best method would be prepared vaccine from a local human strain as quickly as possible.

*Trypanosomiasis Investigation.*—Following the instructions of the Secretary of State that this work was to be proceeded with, under the guidance of the Director of the Medical Research Institute, Mr. Pomeroy with two laboratory attendants proceeded to the Northern Territories in December, 1927. During the same month Mr. Abbott and Mr. Woodward and a laboratory attendant proceeded to Bawku on the north eastern frontier with the mobile unit. Dr. Robinson with a laboratory attendant joined the investigation in March, 1928, on returning from leave. Mr. Pomeroy's results up to date are embodied in the entomologist's report. (Vide appendix to this report).

## POST-MORTEM EXAMINATIONS.

The number of post-mortem examinations made during the year was 107.

[illegible]



*Accidents ; etc.,*

Fractures, skull..	..	..	..	..	..	..	..	..	6
Compound fractures	..	..	..	..	..	..	..	..	3
Strangulation ..	..	..	..	..	..	..	..	..	5
Drowning ..	..	..	..	..	..	..	..	..	4
Gun shot wounds	..	..	..	..	..	..	..	..	3
Crushing accidents	..	..	..	..	..	..	..	..	3
Rupture of the liver	..	..	..	..	..	..	..	..	I
N.A.B. poisoning	..	..	..	..	..	..	..	..	I
Dislocation of cervical vertebrae			..	..	..	..	..	..	I
Still-birth ..	..	..	..	..	..	..	..	..	I
Poisoning ..	..	..	..	..	..	..	..	..	I
Undiagnosed, decomposed	..	..	..	..	..	..	..	..	6
Total	..								107

## HISTOLOGICAL SECTIONS.

The total number of blocks cut during the year was 1,935. A large number of these were of tissues from cases of experimental yellow fever in *Macacus rhesus* monkeys which were being examined by the Director.

## YELLOW FEVER.

The histological picture in the human yellow fever cases which were examined during the year was the same as last year, namely :—

*Stain, Hæmatin and Eosin.*—Liver shows marked parenchymatous degeneration and necrosis of the liver cells, some of the cells being markedly eosinophilic. Recognisable liver tissue remaining is seen as a fringe round the portal tracts and central veins.

*Kidney* shows severe parenchymatous nephritis, the glomeruli escaping. Casts frequent.

*Stain, Osmic Acid.*—*Liver*, fatty degeneration of the cells of the whole lobule.

*Kidney*, fatty degeneration of the cells of the convoluted tubules.

*Heart*, patchy fatty degeneration of the muscle.

*Stain, Levaditi.*—In no specimens were leptospiræ found.

See opposite microphotographs of the change in the liver, kidney, and heart muscle seen in osmic acid preparations of yellow fever tissues.

## NEOPLASMS.

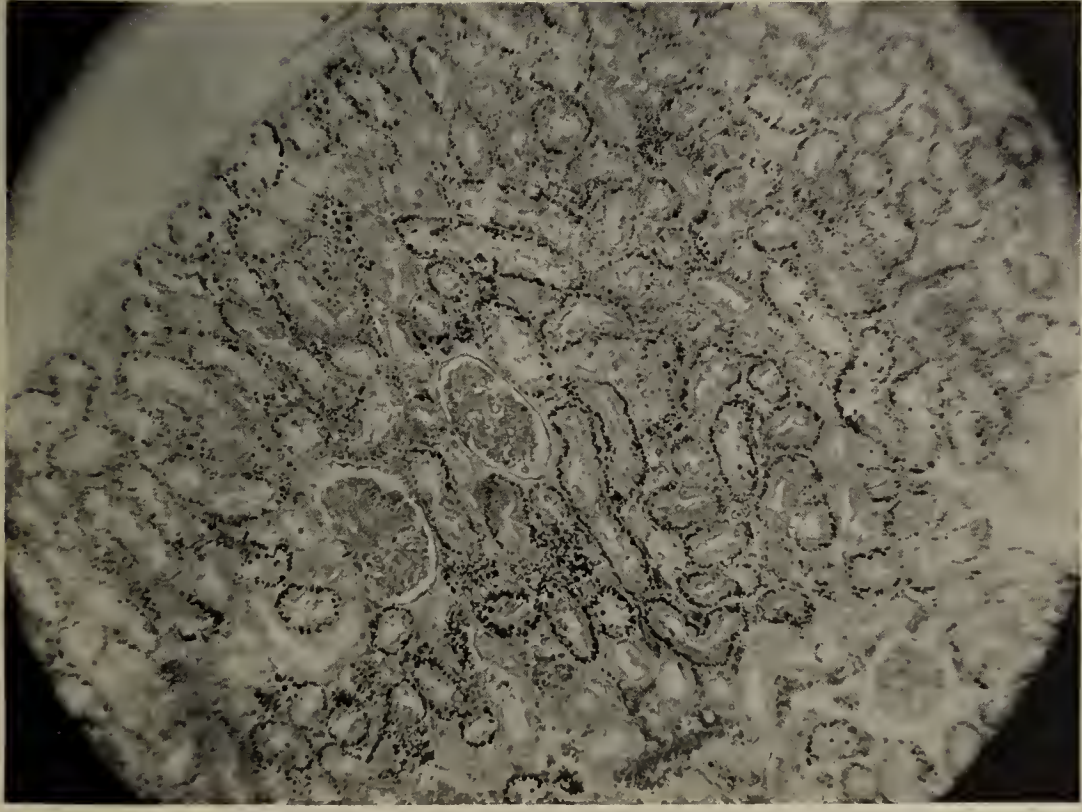
Twenty-six neoplasms were examined histologically, ten of these were non-malignant and included fibroma, lipoma, angioma, fibromyomata, and adenomata-thyroid. Of the malignant tumours, four were carcinomata, and twelve were sarcomata. One sarcoma and one small tumour of the scalp were fully reported in the West African Medical Journal, January, 1928.

## EXAMINATIONS OF FAECES.

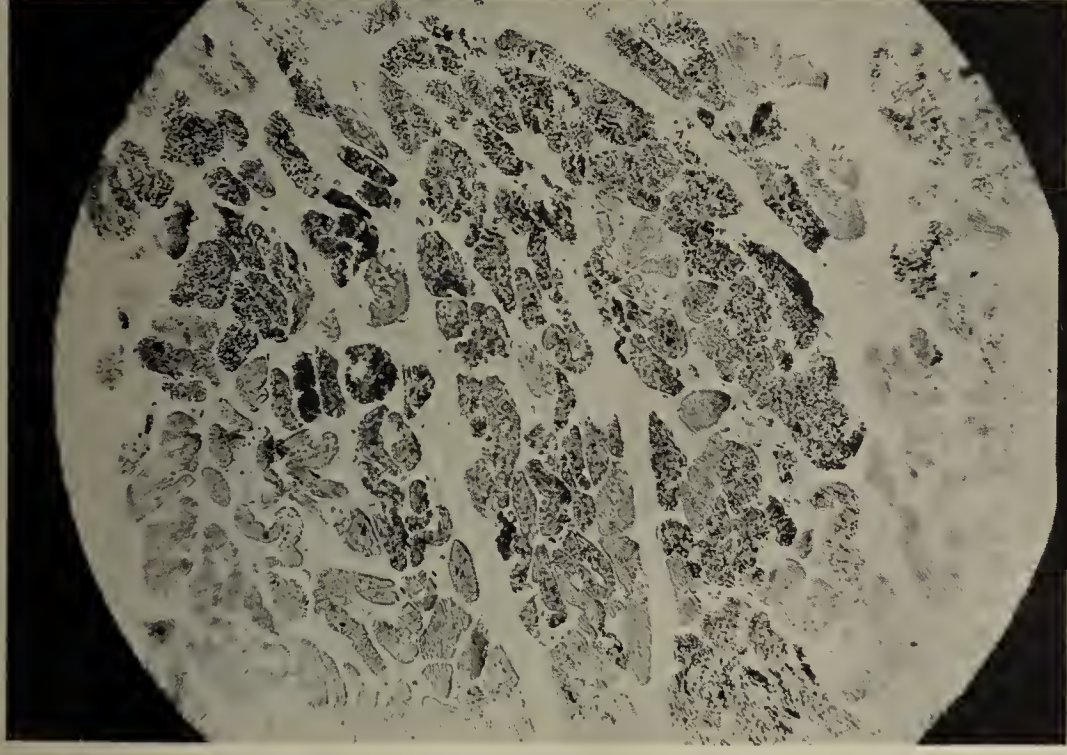
A.—*Result of examinations in cases of suspected dysentery infection.*

E. histolytica alone	..	..	..	...	..	..	..	23
E. histolytica and other protozoa and helminth ova	..	..	..	..	..	..	..	7
Non-lactose-fermenting organism	..	..	..	..	..	..	..	65
Bacillary dysentery suggested by microscopic appearance	..	..	..	..	..	..	..	57
Other findings—protozoa—ova	..	..	..	..	..	..	..	105
Negative	..	..	..	..	..	..	..	185
								<hr/> 442

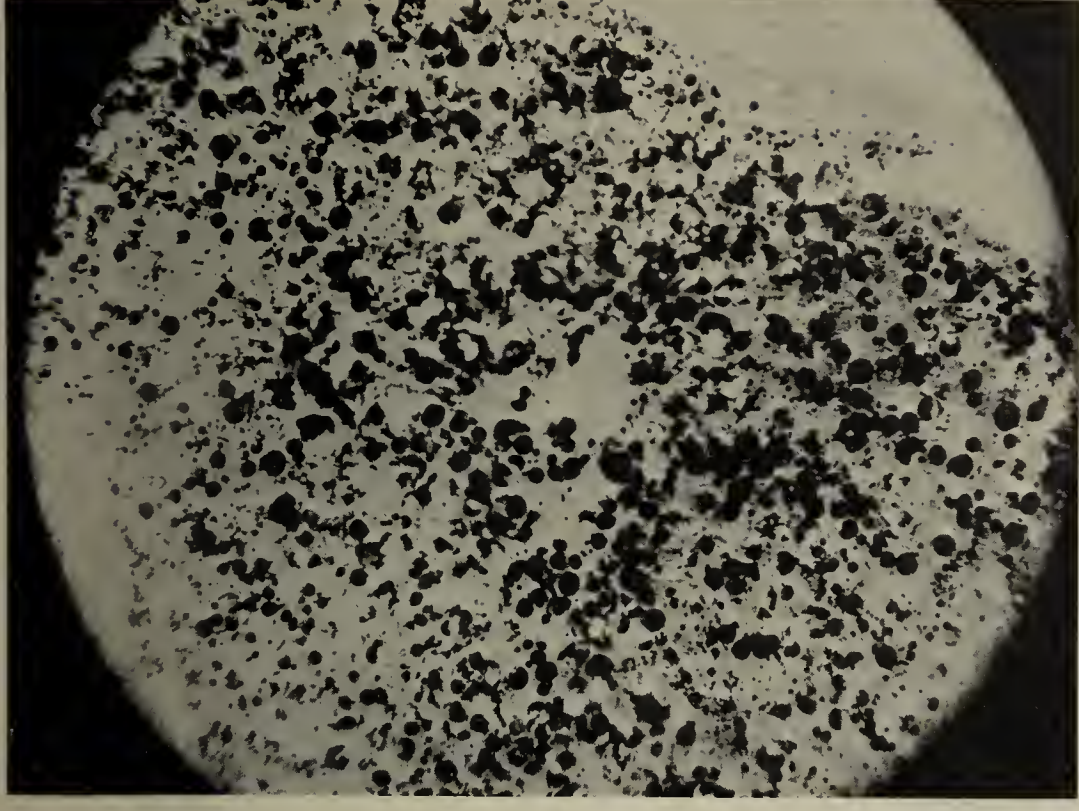




KIDNEY



HEART MUSCLE



LIVER

Preparations stained by Osmic Acid Method.  
To show the Fatty Degeneration in Yellow Fever.  
(Fat stained black.)





B.—*Result of examinations in cases of suspected helminthic infection.*

Ova .. .. .	87
E. histolytica .. .. .	1
Other protozoa .. .. .	4

Table showing number of times dysenteric or helminthic infection found in suspected cases.

Infection found.	Suspected dysentery infection.	Suspected helminth infection.	Total.
E. histolytica .. .. .	30	1	31
E. Coli .. .. .	33	10	43
Iodmamœba Bütschlii .. .. .	1	—	1
Flagellates .. .. .	26	10	36
Ascaris .. .. .	38	43	81
Hookworm .. .. .	34	45	79
Strongyloides .. .. .	18	10	28
Tænia .. .. .	5	8	13
Hymenolepis .. .. .	2	—	2
Trichuris .. .. .	4	6	10
Bilharzia .. .. .	3	3	6

C.—*Result of other Faeces examinations.*

For B. typhosus. Negative in 4.

For B. tuberculosis. Negative in 1.

Total of Faeces Examinations 589.

## EXAMINATIONS OF URINE.

For Bilharzia ova, positive .. .. .	37
„ negative .. .. .	99
For Bacteriological infection, positive .. .. .	3
„ „ negative .. .. .	16
Urea Concentration Tests .. .. .	55
Examination of deposits and chemical tests.. .. .	103
Total of urine examinations .. .. .	313

## EXAMINATIONS OF SPUTUM.

For B. tuberculosis, positive .. .. .	58
„ negative .. .. .	169
For E. histolytica, negative .. .. .	1
Total of Sputum examinations .. .. .	228

## EXAMINATIONS OF BLOOD FILMS.

Malaria infection—positive (P. falciparum) .. .. .	35
„ „ —negative .. .. .	182
Blood counts .. .. .	74
Total of Blood Film examinations .. .. .	291

## MISCELLANEOUS EXAMINATIONS.

Liquors for alcohol content .. .. .	84
Cerebro-spinal Fluids .. .. .	24
Blood cultures .. .. .	14
Infective discharges, etc. .. .. .	100
Total of miscellaneous examinations .. .. .	262





TABLE OF WATER EXAMINATIONS FOR *B. COLI*.

Showing the number of times *B. coli* was found in the smallest volume of each sample.

Source.	c.c.					No. of samples Examined.
	Absent.	100	10	1	0.1	
Laboratory Tap .. ..	22	25	3	—	—	50
No. 1 Storage Reservoir ..	6	6	1	—	2	15
No. 2 „ „ ..	1	4	5	1	1	12
No. 1 Final Filter .. ..	7	1	1	—	—	9
No. 2 „ „ .. ..	2	7	—	—	—	9
No. 3 „ „ .. ..	6	4	1	—	—	11
No. 4 „ „ .. ..	6	1	—	—	1	8
No. 5 „ „ .. ..	5	3	—	—	—	8
No. 6 „ „ .. ..	3	4	1	—	—	8
Soda Waters .. ..	6	9	2	—	—	17
Trade water supplies .. ..	1	—	—	—	—	1
River supplies .. ..	—	—	—	1	—	1
Kumasi supplies .. ..	—	—	—	1	1	2
Totals .. ..	65	64	14	3	5	151

## ANIMAL INOCULATIONS AND EXAMINATIONS.

*Animal Inoculations.*

Animal.				Experiment.	Remarks.
White rats .. ..	5	Relapsing Fever			
Guinea pigs .. ..	2	Yellow Fever			
„ „ .. ..	4	Trypanosomiasis			
„ „ .. ..	2	Test of Cultures.			
„ „ .. ..	3	Diagnosis of T.B.			
„ „ .. ..	1	Well's disease..			
Rabbits .. ..	3	Agglutinating sera			Dysentery group.
„ .. ..	1	Chemical test			
„ .. ..	7	Investigation of rate septi-caemias.*			
<i>Cricetomys gambianus</i> ..	4	Chemical tests			
„ „ ..	88	Investigation of rat septi-caemias.*			
Total .. ..	120	Animals.			

\*Investigation proceeding.



*Animal Examinations.*Rats examined for *B. pestis* 1927-1928.

	<i>C. gambianus.</i>	<i>R. ratus.</i>	<i>R. norvegicus.</i>	Totals.
April 1927 .. ..	10	20	—	30
May .. ..	85	45	—	130
June .. ..	89	31	—	120
July .. ..	100	30	—	130
August .. ..	81	36	3	120
September .. ..	90	39	6	135
October .. ..	100	19	1	120
November .. ..	86	64	—	150
December .. ..	67	21	1	88

Total examined for				
<i>B. pestis</i> .. ..	708	305	10	1,023

During January February and March, 1928, the following numbers of rats were handed over to the Rockefeller Commission for Dr. Noguchi's work:—

	177	76	3	256
Total rats received ..	885	381	13	1,279

No *B. pestis* was found in any of these wild rats. During the year the most interesting of the animal examinations were :

1. A newly imported polo pony which showed trypanosomes in the blood (? pecaui) six others were negative.
2. One dog showing trypanosomes in the blood.
3. A positive diagnosis of anthrax in a cow.
4. Numerous cattle dying in Labadi district examined for Babesia showed a few positive blood films.
5. A plague-like septicæmia in the rat, *C. gambianus*, the study of which is being continued.

ANNUAL REPORT OF MEDICAL RESEARCH INSTITUTE, SEKONDI  
BRANCH, FROM APRIL 1ST TO MARCH 31ST, 1928.

*Staff.*—There was no change in the actual number of the staff from that of last year, *viz.* :—

(a) EUROPEAN—ONE PATHOLOGIST OR ASSISTANT PATHOLOGIST AND ONE LABORATORY ASSISTANT.

Mr. Abbott, Laboratory Assistant, proceeded on leave on the 5th June, 1927.

Major Ingoldby, Pathologist, died on the 22nd June, 1927.

Dr. Robinson took charge of the Institute from June 27th until November 6th, when he went on leave.

Dr. Burgess was in charge from November 6th, 1927, until February 28th, 1928, when Dr. Thomson returned from leave.

(b) NATIVE STAFF.

Mr. Paittoo, Laboratory Attendant, and two laboratory boys.

For the greater part of the year, there has been no European Laboratory Assistant, and Mr. Paittoo deserves special mention for his work.

The acetylene gas plant has now been installed and is working very satisfactorily.





(b) *Accidents, etc.*

Drowning	..	..	..	..	..	..	..	6
Gunshot wounds	..	..	..	..	..	..	..	3
Knife wounds	..	..	..	..	..	..	..	3
Fracture of Skull	..	..	..	..	..	..	..	9
"    "    Cervical Vertebrae	..	..	..	..	..	..	..	1
Rupture Liver	..	..	..	..	..	..	..	1
"    Spleen	..	..	..	..	..	..	..	1
Hanging (suicidal)	..	..	..	..	..	..	..	2
Various injuries	..	..	..	..	..	..	..	6

(c) *Miscellaneous.*

Miliary Tuberculosis	..	..	..	..	..	..	..	2
Marasmus	..	..	..	..	..	..	..	1
Septicæmia	..	..	..	..	..	..	..	4
Meningitis (pneumococcal)	..	..	..	..	..	..	..	1
Kerosene poisoning	..	..	..	..	..	..	..	1
Acute Alcoholism	..	..	..	..	..	..	..	1
Puerperal eclampsia	..	..	..	..	..	..	..	1
Cardiac failure due to prolonged labour. (contracted pelvis)	..	..	..	..	..	..	..	1
Malaria	..	..	..	..	..	..	..	3
Unknown Causes	..	..	..	..	..	..	..	5

9. *Smears.*

Total 43.

Urethral and Vaginal 35 ; 6 positive for gonococci.

Eye smears .. 4 ; 2 " " " "

Nasal smears .. 4 ; 1 " " B.lepræ.

10. *Miscellaneous Examinations.*

C.S.F.	..	..	..	..	..	..	..	1
Blood Cultures	..	..	..	..	..	..	..	4
Throat swabs	..	..	..	..	..	..	..	3
Gland punctures	..	..	..	..	..	..	..	6
Pus from various sources	..	..	..	..	..	..	..	6
Vaccines	..	..	..	..	..	..	..	2

11. *Water Examinations.* Total 118.

	B. coli in 100 cc.	B. coli in 10 cc.	B. coli in 1 cc.	B. coli in .01 cc.	Nega- tive.	Number Examined.
Laboratory Tap	12	6	—	—	22	40
Soda Water	6	3	—	—	47	56
Nsuta Water	2	2	—	—	8	12
Inchaban Water	2	3	3	1	1	10

## RAT EXAMINATIONS.

There was no case of Plague in Sekondi during the year under review. Rats were received from the Medical Officer of Health.

	<i>C. gambianus.</i>	<i>R. rattus.</i>	<i>R. coucha.</i>	Monthly Total.
April .. .. 1927	1	439	10	450
May .. ..	1	637	—	638
June .. ..	2	690	—	692
July .. ..	—	898	—	898
August .. ..	6	695	—	701
September .. ..	—	1,394	—	1,394
October .. ..	—	1,322	—	1,322
November .. ..	1	1,383	—	1,384
December .. ..	3	916	—	919
January .. ..	2	1,999	—	2,001
February .. ..	—	1,556	—	1,556
March .. .. 1928	—	970	—	970
Total .. ..	16	12,899	10	12,925

Rats examined for *B. pestis*.—2,999.

No infected rats were found.

#### ENTOMOLOGICAL REPORT.

See appendix to this report.

#### ACKNOWLEDGMENTS.

The Medical Research Institute is greatly indebted to many medical officers for material sent to it.

We have to thank especially Dr. A. J. R. O'Brien, Surgical Specialist, for much material and for facilities afforded us in the Gold Coast Hospital. We have also to thank the Senior Sanitary Inspectors for material sent to us from the slaughter-house from time to time.

H. M. RUSSELL, *Pathologist*,  
for Director, Medical Research Institute.

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#### REPORT OF THE MEDICAL ENTOMOLOGIST.

1. The investigation on tsetse infestation on the eastern cattle route was resumed on December 15th. A survey of the northern portion of this route was made for a hundred and seventy miles from Mogonori, the border quarantine station, to Wangasi Turu, the junction of the cattle route and the main Tamale-Kumasi road. It was found that the cattle were suffering from lack of water supplies and forage *en route*. Infestation by *G. tachinoides* was found on the route at the Tamne river and considerable infestation was found at the point where the route crosses the Nasia river near Bahale and Suguri. In the latter locality, three species of tsetse have been found, *G. palpalis*, *G. tachinodes* and *G. submorsitans*. As a herd of cattle was followed the entire journey from Mogonori to Turu, it was impossible in the time to fix *definitely* other intervening points of tsetse infestation, but probable localities across streams were noted, which will be investigated later.

2. The figures obtained at the border quarantine stations by Messrs Abbott and Woodward, Laboratory Assistants, who have been examining the blood of cattle imported from French Territory substantiate the figures obtained by myself and Mr. Abbott last year at Yeji on the cattle route where it crosses the Volta. During February, 1928, according to information received from them, the percentage of infection was very low—0.89 per cent.

3. It is interesting to note that during January and February at Mogonori, no tsetse could be found on the Morbiri river, a tributary of the Volta, although tsetse were abundant twelve to sixteen miles away on the banks of the latter. This certainly appeared to be due to the clearing of the vegetation at Mogonori, and in my opinion, is a striking example of the value of such measures.

4. A full report has been submitted on the preliminary survey of the northern part of the cattle route, with suggestions for future work.

5. A certain proportion of the tsetse at Suguri, on the Nasia river, has been found infected with trypanosomes.

6. From December 15th, 1927 until March 23rd, 1928, the date on which Dr. Robinson, the Assistant Pathologist, joined me, I had no European assistance, but the African staff have shown continued improvement in laboratory and field work. There is every reason to suppose that definite statistics will be available by the end of 1928, to decide the most important questions dealing with this particular tsetse problem.

7. Mr. Shotan Williams has become very proficient in the technique of tsetse dissections. To insure absolute accuracy all diagnoses have been done by Dr. Robinson or myself.

8. I wish to express my thanks to the Political Officers who have given me every assistance with regard to accommodation and the supply of labour and also to Capt. Stewart, the Acting Principal Veterinary Officer, who has given me much information as to the cattle route in French Territory with regard to possible tsetse infestation there.

A. W. J. POMEROY,  
*Medical Entomologist.*



## IX.—SCIENTIFIC.

## (b) ANNUAL REPORT OF THE ANALYTICAL CHEMIST.

Classified list of samples dealt with from 1st April, 1927 to 31st March, 1928.

## EXAMINATIONS FOR POISONS.

Human viscera	...	...	...	2
Stomach contents	...	...	...	5
Native medicines	...	...	...	11
Drugs	...	...	...	1

## MEDICAL AND SANITARY SERVICES.

Drugs for purity	...	...	...	5
Waters	...	...	...	13
Aerated waters	...	...	...	9
Foods	...	...	...	3

## CUSTOMS DEPARTMENT.

Gin	...	...	...	20
Rum	...	...	...	8
Beer and stout	...	...	...	71
Wine	...	...	...	63
Medicated wine	...	...	...	24
Liqueur	...	...	...	7
Perfume	...	...	...	221
Essential oil	...	...	...	13
Polish	...	...	...	8
Alcohol de menthe	...	...	...	17
Patent Medicine	...	...	...	88
Sweetened condensed milk	...	...	...	123
Unsweetened condensed milk	...	...	...	124
Skimmed condensed milk	...	...	...	11
Dried condensed milk	...	...	...	10
Natural milk	...	...	...	4
Miscellaneous	...	...	...	12

## DEPARTMENT OF AGRICULTURE.

Cacao	...	...	...	38
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## OTHER DEPARTMENTS.

Miscellaneous	...	...	...	5
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Total ... 926

The analyses of human organs and stomach contents were made in connection with five deaths from suspected poisoning.

34.7 grains of cresols were recovered from a stomach and portion of intestine in a fatal case where lysol was alleged to have been ingested.

Specimens of beans similar to those consumed by a family of which one child died and the other became ill, were found to produce 0.214 per cent hydrocyanic acid on maceration in water.

The beans were identified by the Department of Agriculture as a brown variety of *phaseolus lunatus*; in this instance they were probably consumed in an uncooked state.

No active poison was found in the other fatal cases and none in the native medicines.

Several samples of water from different sources in Koforidua were examined with the view to their possible use as a satisfactory source of potable water for that town.

Nearly all were highly polluted waters and quite unsuited for domestic purposes.

The number of samples submitted by the Customs Department has increased enormously due partly to Order in Council No. 7 of 1927, by which the importation of milk, condensed or evaporated, containing less than 9 per cent of milk-fat was prohibited.

This measure was the outcome of the infant welfare policy to prevent children here being fed on imported skimmed milks.

Since the order came into force on the 15th July, 1927, each brand of milk (53 different brands so far from the continents of Europe and America) has been tested for its content of milk-fat; in the majority of cases the brands were found to be of very good quality.

An officer from the Department of Agriculture has been afforded facilities in the laboratory for investigating problems of moisture and humidity in connection with shipments of cacao beans sampled on the beach at Accra.

This report covers only nine months work as Mr. Simmons was absent on leave from the Colony for three months during the year.

ROBT. SIMMONS, F.I.C.,

*Analytical Chemist.*

W. D. INNESS,

*Director, Medical and Sanitary Service,*

*1st April, 1928.*



## RETURNS.

TABLE I.—MEDICAL, SANITATION AND MEDICAL RESEARCH INSTITUTE STAFF  
ON 31ST MARCH, 1928.

- 1 Director of Medical and Sanitary Service.
- 1 Deputy Director of Medical and Sanitary Service.
- 1 Deputy Director of Sanitary Service.
- 1 Director of Medical Research Institute.
- 2 Assistant Directors of Medical Service.
- 2 Specialists (Surgical).
- 6 Senior Medical Officers.
- 2 Senior Sanitary Officers.
- 4 Pathologists (one seconded from the Medical Officers' Staff).
- 1 Medical Entomologist.
- 51 Medical Officers (9 of whom are Medical Officers of Health).
- 1 Woman Medical Officer.
- 4 Women Medical Officers (Infant Clinics).
- 2 African Medical Officers.
- 1 Junior African Medical Officer.
- 1 Assistant Radiographer.
- 1 Dental Surgeon.
- 2 Analytical Chemists.
- 1 Dispensers' Instructor.
- 1 Medical Storekeeper.
- 1 Secretary, Gold Coast Hospital.
- 12 Superintending Sanitary Inspectors.
- 1 Laboratory Superintendent.
- 2 Laboratory Assistants.

## Vacancies :—

- 1 Specialist (Medical).
- 1 Senior Sanitary Officer.
- 3 Medical Officers.
- 1 Office Assistant and Accountant.
- 1 African Medical Officer.

## EUROPEAN NURSING STAFF.

- 4 Senior Nursing Sisters.
- 20 Nursing Sisters.

## PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF OF :—

- (a) Medical Department.
- (b) Sanitation Branch.
- (c) Medical Research Institute.
- (d) Lunatic Asylum.
- (a) 2 Chief Dispensers.
- 6 First Division Dispensers.
- 5 First Division Nurses.
- 1 Chief Clerk.
- 1 First Division Clerk.
- (b) 1 Chief Clerk.
- 1 First Division Clerk.
- 1 Sanitary Inspector and Training Officer.
- 1 Senior Division Sanitary Inspector.
- 4 First Division Sanitary Inspectors.
- 1 Disinfecter Mechanic.
- (c) 7 Laboratory Attendants.
- 1 Second Division Clerk.
- (d) 1 Chief Attendant.
- 1 Assistant Chief Attendant.
- 1 Matron.

TABLE SHOWING SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR.  
1.—NAMES OF TOWNS.

Station.	1925-26.		1926-27.		1927-28.
	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.
Accra ..	8.5 Square Miles	32	8.5 Square Miles	35	8.5 Square Miles
Cape Coast ..	2.5 " "	4	2.5 " "	4	2.5 " "
Sekondi ..	3 " "	3	3 " "	3	3 " "
Kumasi ..	9 " "	—	9 " "	—	9 " "
Koforidua ..	—	—	2 " "	4	2 " "

2.—POPULATION.

Station.	1925-26.			1926-27.			1927-28.		
	Natives.		Total.	Europeans.		Total.	Natives.		Total.
	Males.	Females.		Males.	Females.		Males.	Females.	
Accra ..	26,000	23,000	49,780	680	100	49,000	26,337	22,937	49,834
Cape Coast ..	7,380	7,620	15,053	39	14	15,082	7,380	7,620	15,098
Sekondi ..	7,000	5,600	12,951	291	60	12,942	7,000	5,600	12,942
Kumasi ..	9,822†	8,692†	18,949	393	42	26,714	28,542*	28,542*	28,853
Koforidua ..	—	—	—	—	—	5,664	3,052	2,552	5,664

\* Logarithmic calculation.  
† House-to-house census by untrained staff.



### 3.—HOUSING.

Station.	1925-26.				1926-27.				1927-28.			
	Houses.		Huts.		Houses.		Huts.		Houses.		Huts.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra ..	260	3,400	—	—	275	3,451	—	—	334	5,227	—	—
Cape Coast ..	32	1,421	—	—	24	1,554	—	156	24	1,454	—	248
Sekondi ..	182	1,422	—	—	162	1,352	—	—	190	1,712	—	—
Kumasi ..	153	1,236	—	—	160	1,334	—	—	240	1,602	—	—
Koforidua ..	—	—	—	—	34	972	—	6	40	1,214	—	See houses

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### 4.—ERECTION OF NEW BUILDINGS.

Station.	1925-26.		1926-27.		1927-28.	
	No. of Houses built without sanction.		No. of Houses built without sanction.		No. of Houses built without sanction.	
	No. of Huts built without sanction.	No. of Huts built without sanction.	No. of Huts built without sanction.	No. of Huts built without sanction.	No. of Huts built without sanction.	No. of Huts built without sanction.
Accra ..	—	—	—	918	—	512
Cape Coast ..	—	—	—	—	—	—
Sekondi ..	61	—	4	—	—	8
Kumasi ..	—	—	—	—	—	—
Koforidua ..	—	—	—	—	—	16

Station.	1925-26.		1926-27.		1927-28.	
	Number of Prosecutions.		Number of Prosecutions.		Number of Prosecutions.	
	Huts.	Houses.	Huts.	Houses.	Huts.	Houses.
Accra ..	—	—	—	—	—	—
Cape Coast ..	—	—	—	—	—	—
Sekondi ..	—	—	—	—	1	—
Kumasi ..	—	—	—	—	—	—
Koforidua ..	—	—	—	—	16	—

5.—(a) LATRINES (PUBLIC).

Station.	1925-26.						1926-27.						1927-28.					
	Number.			New Ones.			Number.			New Ones.			Number.			New Ones.		
	Males.		Females.	Males.		Females.	Males.		Females.	Males.		Females.	Males.		Females.	Males.		Females.
	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.
Accra ..	56	587	48	343	2	20	59	617	51	373	3	30	3	30	54	618	1	10
Cape Coast ..	15	114	15	126	—	—	18	120	17	132	3	8	2	8	17	120	—	—
Sekondi ..	29	213	21	166	5	44	27	182	21	150	7	32	7	32	21	184	—	—
Kumasi ..	38	499	36	480	5	46	32	412	31	345	1	8	2	16	30	398	6	48
Koforidua ..	—	—	—	—	—	—	11	63	10	57	2	10	2	10	9	82	3	10



5.—(b) LATRINES (PRIVATE).

Station.	1925-26.								1926-27.								1927-28.								
	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools Cleansed.	New Cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.	
Accra ..	988	883	883	130	—	—	—	—	939	838	1,929	145	—	—	—	—	—	1,040	915	2,032	127	—	—	—	—
Cape Coast	206	561	76	17	—	—	—	—	225	489	262	25	—	—	—	—	—	149	507	—	25	—	—	—	—
Sekondi ..	443	881	881	72	—	—	—	—	523	580	859	77	—	—	—	—	—	281	570	356	62	—	—	—	—
Kumasi ..	372	744	1,488	69	—	—	—	—	440	1,197	1,197	89	—	—	—	—	—	490	980	1,980	100	—	—	—	—
Koforidua	—	—	—	—	—	—	—	—	80	250	60	15	—	—	—	—	—	215	356	528	16	2	2	1	—

Station.	1925-26.						1926-27.						1927-28.					
	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	
Accra ..	44	7 lorries	45 lorry loads.	4	38 lorry loads	45	47	7 lorries.	45 lorry loads.	3	45	47	7 lorries.	65 lorry loads.	3	50 cart-loads.		
Cape Coast	35	3 lorries & 1 cart.	64 cart-loads.	—	2 cart loads.	13	34	4 lorries and 1 cart.	62.7 lorry and cart-loads.	—	13	34	3 carts. 3 lorries.	54 cart and lorry loads.	—	2 cart-loads.	13	
Sekondi ..	25	3 lorries.	28 lorry loads.	—	28 lorry loads.	41	29	3 lorries.	25 lorry loads.	—	54	29	3 lorries.	253 head loads.	10	249 head-loads.	58	
Kumasi ..	32	3 lorries. 2 carts and 8 baskets.	10,589 baskets.	4 baskets.	360 head loads.	4	38 and 48 Incinerators	1	3,505 (cart-loads and head loads.	—	—	42 and 61 Incinerators.	—	3,941 head-loads.	—	123 cart-loads. 1,621 baskets.	4	
Koforidua	—	—	—	—	—	—	7	4	25 cart-loads	—	12	8	3 carts and 1 lorry	20 lorry loads and 12 cart loads.	—	—	11	



## 7.—MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

[illegible]

8.—AVERAGE DAILY NUMBER OF CARTLOADS OF CANS, BOTTLES, AND INCOMBUSTIBLE MATERIALS FROM HOUSES AND COMPOUNDS.

Station.	1925-26.	1926-27.	1927-28.
Accra	..	..	50 cart loads.
Cape Coast	..	40 cart loads	2 cart loads.
Sekondi	..	2 cart loads	54 cart loads.
Kumasi	..	40 head loads	261 lorry loads.
Koforidua	..	184 cart loads	2 lorry loads.
	..	4 cart loads	..





Station.	Masonry Drains.								Earth Drains.															
	1925-26.				1926-27.				1927-28.				1925-26.				1926-27.				1927-28.			
	Lineal yards.	Lineal yards reconstructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards.	Lineal yards reconstructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards.	Lineal yards reconstructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.			
Accra ..	75,962	877	—	12,749	83,820	1,798	586	5,474	7,858	—	120	13,426	40,861	25,982	Fortnightly Monthly.	34,508	25,880	Fortnightly Mon thly.	142,670	40,862	Weekly. Monthly.			
Cape Coast ..	28,360	—	—	1,940	30,300	80	50	1,151	31,451	100	800	566	4,378	—	—	2,460	—	—	3,754	Nil.	Monthly.			
Sekondi ..	30,810	—	120	6,066	33,911	—	120	3,100	36,000	—	1,350	1,930	10,947	87	When necessary. do.	6,757	301	When necessary. do.	10,742	1,888	Monthly.			
Kumasi ..	15,453	—	1,450	253	16,912	—	—	1,459	17,601	—	—	689	21,083	35,499	do.	37,464	63,791	do.	156,429	67,039	When necessary:			
Koforidua ..	—	—	—	—	6,188	—	17	3,589	9,472	778	—	3,284	—	—	—	2,700	300	Every ten days.	8,220	2,055	Every three weeks.			

# II.—INSPECTION AND PROSECUTIONS.

Station.	1925-26.										1926-27.										1927-28.									
	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary conditions.	Persons fined for insanitary conditions.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary conditions.	Persons fined for insanitary conditions.	No. of aerated and Soda water factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary condition.	Persons fined for insanitary condition.	No. of aerated and Soda water factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary condition.	Persons fined for insanitary condition.	No. of aerated and Soda water factories inspected.
Accra ..	26	141,025	899	145	710	1,898	1,258	3								132,491	838	106	689	2,405	1,983	5	20	44,834	970	504	897	3,784	2,447	4
Cape Coast ..	12	65,662	269	368	239	251	83	—						—	12	64,630	483	196	417	382	453	—	12	47,285	414	483	413	290	294	—
Sekondi ..	12	49,076	183	46	102	367	551	1						2	15	55,021	176	113	135	1,480	669	2	15	57,347	336	100	225	996	584	1
Kumasi ..	11	83,003	258	44	202	1,678	2,385	1						1	17	96,547	263	203	197	3,769	3,603	1	17	61,450	570	280	505	1,753	2,561	1
Koforidua ..	—	—	—	—	—	—	—	—						—	3	28,683	538	160	527	235	251	—	3	44,317	307	294	333	653	20	—



TABLE III.

Accurate return of statistics of population for the year cannot be given as the birth and death registration districts cover but a small portion of the Colony and its dependencies.

TABLE V.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1927-28.

Diseases.	Remaining in Hospital at 31st. March, 1926- 7.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 19 7-28.	Remarks
		New Cases.	Deaths.			
I.--Epidemic, Endemic, and Infectious Diseases.						
I. ENTERIC GROUP—						
(a) Typhoid Fever ..	I	13	I	14	—	
(b) Paratyphoid A ..	2	—	—	2	—	
Paratyphoid B ..	—	4	—	4	—	
(d) Type not defined ..	—	2	—	2	—	
2. Typhus .. ..	—	—	—	—	—	
3. Relapsing Fever .. ..	—	37	2	37	—	
4. Undulant Fever.. ..	—	—	—	—	—	
5. MALARIA—						
(a) Tertian .. ..	—	287	8	287	10	
(b) Quartan .. ..	—	5	—	5	I	
(c) Aestivo-autumnal ..	9	419	17	428	5	
(d) Cachexia .. ..	4	9	2	13	—	
(e) Blackwater .. ..	—	14	I	14	—	
(f) Unclassified .. ..	I	155	6	156	3	
6. SMALLPOX—						
Alastrim .. ..	—	—	—	—	—	
7. Measles .. ..	—	3	—	3	—	
8. Scarlet Fever .. ..	—	I	—	I	—	
9. Whooping Cough .. ..	—	2	—	2	—	
10. Diphtheria .. ..	—	—	—	—	—	
11. Influenza .. ..	—	86	—	86	I	
12. Miliary Fever .. ..	—	—	—	—	—	
13. Mumps .. ..	—	10	—	10	—	
14. Cholera .. ..	—	—	—	—	—	
15. Epidemic diarrhoea .. ..	—	2	—	2	—	
16. DYSENTERY—						
(a) Amdœbic .. ..	2	192	22	194	2	
(b) Bacillary .. ..	4	102	12	106	—	
(c) Undefined or due to other cause. .. ..	2	79	9	81	3	
17. PLAGUE—						
(a) Bubonic .. ..	—	—	—	—	—	
(b) Pneumonic .. ..	—	—	—	—	—	
(c) Septicaemic .. ..	—	—	—	—	—	
(d) Undefined .. ..	—	—	—	—	—	
18. Yellow Fever .. ..	—	27	16	27	—	
19. Spirochaetosis .						
Ictero-haemorrhagica ..	—	I	—	I	—	
20. Leprosy .. ..	77	12	I	89	—	
21. Erysipelas .. ..	—	3	—	3	—	
22. Acute Poliomyelitis .. ..	—	—	—	—	—	
23. Encephalitis Lethargica ..	—	I	I	I	—	
24. Epidemic Cerebro-spinal Fever	—	2	I	2	—	
25. OTHER EPIDEMIC DISEASES—						
(a) Rubeola (German Measles)	—	—	—	—	—	
(b) Varicella (Chicken- pox) .. ..	8	37	—	45	6	
(c) Kala-azar .. ..	—	—	—	—	—	
(d) Phlebotomus Fever .. ..	—	—	—	—	—	
(e) Dengue .. ..	—	3	—	3	—	
(f) Epidemic Dropsy .. ..	—	—	—	—	—	
(g) Yaws .. ..	8	230	I	238	16	
(h) Trypanosomiasis .. ..	4	12	4	16	2	
Total carried forward ..						

Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
<i>Epidemic, Endemic and Infections Diseases (contd.)</i>						
<i>Brought forward ..</i>						
26. Glanders .. .. .	—	—	—	—	—	
27. Anthrax .. .. .	—	—	—	—	—	
28. Rabies .. .. .	—	—	—	—	—	
29. Tetanus .. .. .	1	22	10	23	2	
30. Mycosis .. .. .	—	—	—	—	—	
31. Tuberculosis, Pulmonary and Laryngeal	7	246	104	253	12	
32. Tuberculosis of the Meninges or Central Nervous System	—	5	1	5	1	
33. Tuberculosis of the Intestines or Peritoneum	2	7	3	9	—	
34. Tuberculosis of the Vertebral Column	9	22	3	31	3	
35. Tuberculosis of bones and joints	4	19	2	23	2	
36. Tuberculosis of other organs, ..	—	5	1	5	—	
(a) Skin or Subcutaneous Tissue (Lupus)	—	1	—	1	—	
(b) Bones .. .. .	—	13	—	13	—	
(c) Lymphatic System	2	9	1	11	—	
(d) Genito-urinary ..	—	4	1	4	—	
(e) Other organs ..	—	—	—	—	—	
37. Tuberculosis disseminated— ..						
(a) Acute .. .. .	1	2	3	3	—	
(b) Chronic .. .. .	—	2	2	2	—	
38. Syphilis— .. .. .						
(a) Primary .. .. .	5	66	—	71	5	
(b) Secondary .. .. .	—	18	2	18	2	
(c) Tertiary .. .. .	5	71	3	76	1	
(d) Hereditary .. .. .	—	1	—	1	—	
(e) Period not indicated	3	5	2	8	—	
39. Soft Chancre .. .. .	5	58	—	63	3	
40. A.—Gonorrhoea and its complications	9	290	4	299	13	
B.—Gonorrhoeal Ophthalmia	—	49	—	49	1	
D.—Gonorrhoeal Arthritis ..	—	35	—	35	1	
D.—Granuloma Venereum ..	—	5	1	5	2	
41. Septicæmia .. .. .	—	23	9	23	—	
42. Other Infectious Diseases— ..	—	2	—	2	—	
Trypanosomiasis .. .. .	—	—	—	—	—	
II.—General Diseases not mentioned above.						
43. Cancer or other malignant Tumours of the Buccal Cavity	1	6	—	7	—	
44. Cancer or other malignant Tumours of the Stomach or Liver	—	7	2	7	—	
45. Cancer or other malignant Tumours of the Peritoneum Intestines, Rectum	—	7	3	7	1	
46. Cancer or other malignant Tumours of the Female Genital Organs	—	3	—	3	—	
47. Cancer or other malignant Tumours of the Breast	—	20	3	20	1	
48. Cancer or other malignant Tumours of the Skin	—	—	—	—	—	
49. Cancer or other malignant Tumours of Organs not specified	4	7	2	11	—	
50. Tumours non-Malignant ..	12	53	2	65	6	
51. Acute Rheumatism .. .. .	—	—	—	—	—	
52. Chronic Rheumatism .. .. .	2	126	3	128	6	
53. Scurvy (including Barlow's Disease)	—	—	—	—	—	
54. Pellagra .. .. .	—	—	—	—	—	
55. Beri-Beri.. .. .	1	44	9	45	1	
56. Rickets .. .. .	—	—	—	—	—	
57. Diabetes (not including Insipidus)	—	8	—	8	—	
<i>Total carried forward ..</i>						



Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
<i>Epidemic, Endemic and Infectious Diseases—continued</i>						
<i>Brought forward</i> ..	—	—	—	—	—	
58. Anæmia, .. .. .	—	—	—	—	—	
(a) Pernicious .. .. .	—	5	3	5	—	
(b) Other Anæmias and Chlorosis .. .. .	—	44	9	44	1	
59. Diseases of the Pituitary Body .. .. .	—	—	—	—	—	
60. Diseases of the Thyroid Gland—	—	—	—	—	—	
(a) Exophthalmic Goitre .. .. .	—	—	—	—	—	
(b) Other diseases of the Thyroid Gland Myxœdema .. .. .	—	5	1	5	—	
61. Diseases of the Para-Thyroid Glands .. .. .	—	—	—	—	—	
62. Diseases of the Thymus .. .. .	—	1	1	1	—	
63. Diseases of the Supra-Renal Glands .. .. .	—	1	—	1	1	
64. Diseases of the Spleen .. .. .	1	5	—	6	2	
65. Leukæmia—	—	—	—	—	—	
(a) Leukæmia .. .. .	—	1	—	1	—	
(b) Hodgkin's Disease .. .. .	—	2	—	2	—	
66. Alcoholism .. .. .	—	10	—	10	—	
67. Chronic poisoning by mineral substances lead, mercury, &c.) .. .. .	1	2	—	3	—	
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.) .. .. .	—	—	—	—	—	
69. Other General Diseases—	—	—	—	—	—	
Auto-intoxication .. .. .	—	5	—	5	1	
Purpura Hæmorrhagica .. .. .	—	—	—	—	—	
Hæmophilia .. .. .	—	—	—	—	—	
Diabetes Insipidus .. .. .	—	3	—	3	—	
III.—Affections of the Nervous System and Organs of the Senses.						
70. Encephalitis (not including Encephalitis Lethargica) .. .. .	—	10	8	10	—	
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis) .. .. .	—	10	7	10	—	
72. Locomotor Ataxia .. .. .	—	7	5	7	—	
73. Other affections of the Spinal Cord .. .. .	—	4	1	4	—	
74. Apoplexy—	—	—	—	—	—	
(a) Hæmorrhage .. .. .	1	12	7	13	1	
(b) Embolism .. .. .	—	1	—	1	—	
(c) Thrombosis .. .. .	—	5	3	5	—	
75. Paralysis—	—	—	—	—	—	
(a) Hemiplegia .. .. .	5	40	4	45	7	
(b) Other Paralysis .. .. .	2	19	4	21	1	
76. General Paralysis of the Insane .. .. .	—	4	4	4	—	
77. Other forms of Mental Alienation .. .. .	1	109	4	110	—	
78. Epilepsy .. .. .	1	13	—	14	—	
79. Eclampsia, Convulsions (non-puerperal) 5 years or over .. .. .	—	—	—	—	—	
80. Infantile Convulsions .. .. .	—	4	2	4	—	
81. Chorea .. .. .	—	1	1	1	—	
82. A.—Hysteria .. .. .	—	12	—	12	—	
B.—Neuritis .. .. .	5	15	1	20	3	
C.—Neurasthenia .. .. .	—	15	—	15	2	
83. Cerebral Softening .. .. .	—	4	2	4	—	
III.—Affection of the Nervous System and Organs of the Senses. (contd.)						
84. Other affections of the Nervous System such as Paralysis Agitans .. .. .	4	22	7	26	—	
<i>Total carried forward</i> ..						

Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
<i>Affections of the Nervous System and Organs of Senses (contd).</i>						
<i>Brought forward</i> ..						
85. Affections of the Organs of Vision—						
(a) Diseases of the Eye	—	60	—	60	—	
(b) Conjunctivitis ..	—	III	—	III	4	
(c) Trachoma .. ..	—	5	—	5	—	
(d) Tumours of the Eye	—	I	I	I	—	
(e) Other affections of the Eye	8	84	—	92	7	
86. Affections of the Ear or Mastoid Sinus	I	5I	I	52	2	
IV.— <i>Affections of the Circulatory System</i>						
87. Pericarditis .. ..	I	7	2	8	I	
88. Acute Endocarditis or Myocarditis	I	6	I	7	I	
89. Angina Pectoris .. ..	—	2	—	2	—	
90. Other Diseases of the Heart—	—	2	—	2	I	
(a) Valvular—						
Mitral .. ..	—	6I	3I	6I	—	
Aortic .. ..	—	20	8	20	—	
Tricuspid .. ..	—	—	—	—	—	
Pulmonary .. ..	—	I	I	I	—	
(b) Myocarditis ..	2	42	9	44	3	
91. Diseases of the Articles—						
(a) Aneurism .. ..	I	4	2	5	—	
(b) Arterio-Sclerosis ..	I	—	—	I	—	
(c) Other diseases ..	I	IO	—	II	—	
92. Embolism or Thrombosis (non-cerebral) .. ..	—	—	—	—	—	
93. Diseases of the Veins—						
Hæmorrhoids .. ..	3	68	I	7I	4	
Varicose Veins .. ..	—	2	—	2	—	
Phlebitis .. ..	—	2	—	2	—	
94. Diseases of the Lymphatic System	—	I	—	I	—	
Lymphangitis .. ..	—	30	—	30	3	
Lymphadenitis, Bubo (non-specific)	I	82	—	83	9	
95. Hæmorrhage of undetermined cause	—	5	I	5	—	
96. Other affections of the Circulatory System	—	6	I	6	—	
V.— <i>Affections of the Respiratory System.</i>						
97. Diseases of the Nasal Passages—						
Foreign Body .. ..	—	I	—	I	—	
Adenoids .. ..	—	2	—	2	—	
Polypus .. ..	—	3	—	3	—	
Rhinitis .. ..	—	I	—	I	13	
Coryza .. ..	I	12	—	13	I	
98. Affections of the Larynx—						
Foreign Body .. ..	—	3	—	3	—	
Laryngitis .. ..	—	6	—	6	—	
99. Bronchitis—						
(a) Acute .. ..	9	257	15	266	4	
(b) Chronic .. ..	3	143	5	146	I	
100. Broncho-Pneumonia .. ..	I	75	23	76	I	
<i>Total carried forward</i> ..						



Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
V.—Affections of the Respiratory System (contd.)						
Brought forward ..						
101. Pneumonia—						
(a) Lobar .. ..	8	276	91	284	9	
(b) Unclassified .. ..	5	52	15	57	1	
102. Pleurisy, Empyema .. ..	5	99	6	104	8	
103. Congestion of the Lungs	—	1	—	1	—	
104. Gangrene of the Lungs ..	—	1	—	1	—	
105. Asthma .. ..	—	13	1	13	—	
106. Pulmonary Emphysema ..	—	1	—	1	—	
107. Other affections of the Lungs— Pulmonary Spirochaetosis ..	—	6	1	6	—	
VI.—Diseases of the Digestive System.						
108. A.—Diseases of Teeth or Gums	1	44		45	2	
Caries. Pyorrhœa, &c.,						
B.—Other affections of the Mouth—	1	2	1	3	—	
Stomatitis .. ..	—	24	1	24	1	
Glossitis, &c. .. ..	—	1	—	1	—	
109. Affections of the Pharynx						
Tonsils—						
Tonsillitis .. ..	—	61	—	61	1	
Pharyngitis .. ..	—	9	1	9	1	
110. Affections of the Oesophagus	—	—	—	—	—	
111. A.—Ulcer of the Stomach ..	1	5	—	6	—	
B.—Ulcer of the Duodenum	2	5	—	7	—	
112. Other affections of the Sto- mach—						
Gastritis .. ..	—	68	1	68	—	
Dyspepsia, &c... ..	—	35	—	35	—	
113. Diarrhœa and Enteritis—						
Under two years	—	17	2	17	—	
114. Diarrhœa and Enteritis—						
Two years and over ..	4	185	19	189	5	
Colitis .. ..	1	24	—	25	—	
Ulceration .. ..	—	—	—	—	—	
114a. Sprue .. ..	—	—	—	—	—	
115. Ankylostomiasis .. ..	1	98	10	99	9	
116. Diseases due to Intestinal Parasites—						
(a) Cestoda (Tænia) ..	1	35	—	36	1	
(b) Trematoda (Flukes)	—	3	—	3	—	
(c) Nematoda (other than Ankylostoma)—						
Ascaris .. ..	—	25	2	25	1	
Trichocephalus dispar ..	—	—	—	—	—	
Trichina .. ..	—	—	—	—	—	
Dracunculus .. ..	10	384	1	394	17	
Strongylus .. ..	—	—	—	—	—	
Oxyuris .. ..	—	—	—	—	—	
(d) Coccidia .. ..	—	—	—	—	—	
(e) Other parasites ..	—	2	—	2	—	
(f) Unclassified ..	—	9	—	9	—	
117. Appendicitis .. ..	1	46	4	47	2	
118. Hernia .. ..	14	209	11	223	18	
119. A.—Affections of the Anus, Fistula, &c.	3	42	1	45	10	
B.—Other affections of the Intestines—	—	13	5	13	—	
Enteroptosis .. ..	—	1	—	1	—	
Constipation .. ..	2	282	2	284	3	
Total carried forward ..						

Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
VI.—Diseases of the Digestive System (contd.)						
Brought forward ..						
120. Acute Yellow Atrophy of the Liver	—	—	—	—	—	
121. Hydatid of the Liver .. ..	—	—	—	—	—	
122. Cirrhosis of the Liver— ..	—	—	—	—	—	
(a) Alcoholic .. ..	—	2	—	2	—	
(b) Other forms .. ..	—	9	4	9	—	
123. Biliary Calculus .. ..	1	—	—	1	—	
124. Other affections of the Liver—	—	—	—	—	—	
Abscess .. ..	1	35	9	36	3	
Hepatitis .. ..	—	41	2	41	1	
Cholecystitis .. ..	—	3	—	3	—	
Jaundice .. ..	4	25	—	29	—	
125. Diseases of the Pancreas ..	—	—	—	—	—	
126. Peritonitis (of unknown cause)	—	16	10	16	—	
127. Other affections of the Digestive System	1	17	1	18	1	
VII.—Diseases of the Genito-urinary System (non-Venereal).						
128. Acute Nephritis .. ..	2	70	18	72	6	
129. Chronic Nephritis .. ..	1	49	20	50	3	
130. A.—Chyluria .. ..	—	4	—	4	—	
B.—Schistosomiasis .. ..	8	66	1	74	1	
131. Other affections of the Kidney	—	2	1	2	—	
Pyelitis, &c., .. ..	3	4	4	7	—	
132. Urinary Calculus .. ..	—	4	—	4	—	
133. Diseases of the Bladder—	—	—	—	—	—	
Cystitis .. ..	3	73	3	76	2	
134. Diseases of the Urethra ..	—	—	—	—	—	
(a) Stricture .. ..	3	120	9	123	11	
(b) Other .. ..	1	41	1	42	4	
135. Diseases of the Prostate—	—	—	—	—	—	
Hypertrophy .. ..	—	1	—	1	—	
Prostatitis .. ..	1	9	—	10	3	
136. Diseases (non-Venereal) of the Genital Organs of Man—	—	88	2	88	3	
Epididymitis .. ..	1	20	—	21	1	
Orchitis .. ..	2	54	1	56	3	
Hydrocele .. ..	2	51	1	53	5	
Ulcer of Penis .. ..	1	80	—	81	2	
Phimosis and Paraphimosis	1	85	—	86	1	
137. Cysts or other non-malignant Tumours of the Ovaries	—	8	—	8	1	
138. Salpingitis— .. ..	1	7	—	8	—	
Abscess of the Pelvis ..	1	18	—	19	19	
139. Uterine Tumours (non-malignant)	3	16	1	19	—	
140. Uterine Hæmorrhage (non-puerperal)	—	1	1	1	—	
141. A.—Metritis .. ..	—	31	1	31	—	
B.—Other affections of the Female Genital Organs—	—	14	3	14	3	
Displacements of Uterus	4	12	1	16	1	
Amenorrhœa .. ..	—	5	—	5	—	
Dysmenorrhœa .. ..	—	18	—	18	—	
Leucorrhœa .. ..	—	10	—	10	—	
142. Diseases of the Breast (non-puerperal—	—	1	—	1	—	
Mastitis .. ..	—	13	—	13	—	
Abscess of Breast .. ..	—	5	—	5	—	
Total carried forward ..						



Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total.		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
<i>Brought forward</i> ..						
VIII.— <i>Puerperal State.</i>						
143. Normal Labour .. ..	1	15	2	16	1	
B.—Accidents of Pregnancy—						
(a) Abortion .. ..	3	18	—	21	1	
(b) Ectopic Gestation ..	—	—	—	—	—	
(c) Other accidents of Pregnancy	1	19	6	20	—	
144. Puerperal Hæmorrhage ..	—	2	—	2	—	
145. Other accidents of Parturition	—	54	11	54	2	
146. Puerperal Septicæmia ..	—	15	8	15	—	
147. Phlegmasia Dolens .. ..	—	1	—	1	—	
148. Puerperal Eclampsia .. ..	—	4	1	4	—	
149. Sequelæ of Labour .. ..	—	10	1	10	—	
150. Puerperal affections of the Breast	1	—	—	1	—	
IX.— <i>Affections of the Skin and     Cellular Tissues.</i>						
151. Gangrene .. ..	—	11	4	11	1	
152. Boil—	—	36	—	36	—	
Carbuncle .. ..	1	27	—	28	—	
153. Abscess— .. ..	13	188	7	201	14	
Whitlow .. ..	1	50	—	51	2	
Cellulitis .. ..	5	223	5	228	18	
154. A.—Tinea .. ..	5	3	—	8	—	
B.—Scabies .. ..	—	11	—	11	—	
155. Other Diseases of the Skin—	—	40	—	40	—	
Erythema .. ..	—	4	—	4	1	
Urticaria .. ..	—	24	—	24	—	
Eczema .. ..	—	26	—	26	2	
Herpes .. ..	—	7	—	7	—	
Psoriasis .. ..	—	3	—	3	—	
Elephantiasis .. ..	—	35	1	35	5	
Myiasis .. ..	—	—	—	—	—	
Chiggers .. ..	—	3	—	3	—	
Cutaneous Leishmaniasis ..	—	—	—	—	—	
Ulcers .. ..	128	787	20	915	93	
X.— <i>Diseases of Bones and Organs of     Locomotion (other than Tuberculous).</i>						
156. Diseases of Bones—	—	—	—	—	—	
Osteitis .. ..	4	42	46	8	—	
157. Diseases of Joints—						
Arthritis .. ..	4	97	2	101	8	
Synovitis .. ..	7	54	—	61	1	
158. Other Diseases of Bones or Organs of Locomotion ..	7	114	2	121	7	
XI.— <i>Malformations.</i>						
159. Malformations—						
Hydrocephalus .. ..	—	—	—	—	—	
Hypospadias .. ..	—	—	—	—	—	
Spina Bifida, &c., .. ..	2	11	2	13	3	
XII.— <i>Diseases of Infancy.</i>						
160. Congenital Debility .. ..	—	1	—	1	—	
161. Premature Birth .. ..	—	—	—	—	—	
162. Other affections of Infancy ..	3	—	—	3	—	
163. Infant neglect (infants of three months or over	—	1	1	1	—	
XIII.— <i>Affections of Old Age.</i>						
164. Senility—	—	3	1	3	—	
Senile Dementia .. ..	1	4	4	5	—	
<i>Total carried forward</i> ..						

Diseases.	Remaining in Hospital at 31st. March, 1926-27.	Yearly Total		Total Cases Treated.	Remain- ing in Hospital at 31st. March, 1927-28.	Remarks.
		New Cases.	Deaths.			
<i>Brought forward</i> ..						
XIV.— <i>Affections produce by External Causes.</i>						
165. Suicide by Poisoning .. ..	—	—	—	—	—	
166. Corrosive Poisoning (intentional)	—	2	1	2	1	
167. Suicide by Gas Poisoning ..	—	—	—	—	—	
168. Suicide by Hanging or Strangu- lation	—	8	8	8	—	
168a Attempted Suicide by Hanging	—	1	—	1	—	
169 Suicide by Drowning .. ..	—	—	—	—	—	
170. Suicide by Firearms .. ..	3	1	1	4	—	
171. Suicide by cutting or stabbing Instruments .. ..	—	3	3	3	—	
172. Suicide by jumping from a height	—	1	1	1	—	
173. Suicide by crushing .. ..	—	4	4	4	—	
174. Other Suicide .. ..	—	6	6	6	—	
175. Food Poisoning— .. ..	—	11	—	11	—	
Botulism .. ..	—	—	—	—	—	
176. Attacks of poisonous animals— Snake Bite .. ..		19	1	19	—	
Insect Bite .. ..	—	9	—	9	—	
177. Other accidental Poisonings ..	—	10	4	10	—	
178. Burns (by Fire) .. ..	—	29	7	29	2	
179. Burn (other than by Fire) ..	—	16	3	16	—	
180. Suffocation (accidental) ..	—	—	—	—	—	
181. Poisoning by Gas (accidental)	—	5	1	5	—	
182. Drowning (accidental) ..	—	1	—	1	—	
183. Wounds (by Firearms, war excepted) .. ..	7	92	24	99	12	
184. Wounds (by cutting or stabbing Instruments)	14	584	18	598	21	
185. Wounds (by Fall) .. ..	7	72	—	79	6	
186. Wounds (in Mines or Quarries)	—	9	—	9	2	
187. Wounds (by Machinery) ..	—	10	1	10	1	
188. Wounds (crushing, <i>i.e.</i> railway accidents, &c.,)	20	339	47	359	14	
189. Injuries inflicted by Animals Bites, Kicks, &c., .. ..	1	15	1	16	1	
190. Wounds inflicted on Active Service						
191. Executions of civilians by bel- igerents						
192. A.—Over fatigue .. ..	—	4	1	4	1	
B.—Hunger or Thirst .. ..	—	1	1	1	—	
193. Exposure to Cold, Frostbite, &c.	—	—	—	—	—	
194. Exposure to Heat— .. ..						
Heatstroke	—	1	1	1	—	
Sunstroke .. ..	—	—	—	—	—	
195. Lightning Stroke .. ..	—	—	—	—	—	
196. Electric Shock .. ..	—	—	—	—	—	
197. Murder by Firearms .. ..	—	—	—	—	—	
198. Murder by cutting or stabbing Instruments	—	—	—	—	—	
199. Murder by other means ..	—	—	—	—	—	
200. Infanticide (Murder of an Infant under one year)	—	—	—	—	—	
201. A.—Dislocation .. ..	3	24	1	27	2	
B.—Sprain .. ..	—	31	—	31	—	
C.—Fracture .. ..	21	297	30	318	33	
202. Other external Injuries ..	5	290	4	295	11	
Rape .. ..	—	8	1	8	—	
203. Deaths by Violence of un- known cause .. ..	—	—	—	—	—	
<i>Total carried forward</i> ..						



<i>Diseases.</i>	<i>Remaining in Hospital at 31st. March, 1926-27.</i>	<i>Yearly Total.</i>		<i>Total Cases Treated.</i>	<i>Remain- ing in Hospital at 31st. March, 1927-28.</i>	<i>Remarks.</i>
		<i>New Cases.</i>	<i>Deaths.</i>			
<i>Brought forward ..</i>						
<i>XV.—Ill-Defined Diseases.</i>						
204. Sudden Death (cause unknown)	—	1	—	1	—	
205. A.—Diseases not already speci- fied or ill-defined—	—	2	—	2	—	
Ascites .. ..	—	13	2	13	2	
Oedema .. ..	—	16	—	16	2	
Asthenia .. ..	—	32	4	32	1	
Shock .. ..	—	4	—	4	—	
Hyperpyrexia .. ..	—	2	—	2	—	
B.—Malingering .. ..	—	35	—	35	—	
<i>XVI.—Diseases, the total of which have not caused 10 Deaths</i>	—	76	—	76	—	
<i>Total .. ..</i>	623	11,804	980	12,427	601	
Born in Hospital .. ..	1	—	—	—	—	
Admitted with mother .. ..	1	—	—	—	—	
Admitted with child .. ..	1	—	—	—	—	
<i>Total .. ..</i>	626	11,804	980	12,427	601	

## Surgical Operations.

Major .. 1,158.

Minor .. 3,137.

TABLE VI.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1927-28.

<i>Diseases.</i>						<i>Male.</i>	<i>Female.</i>
<i>I.—Epidemic, Endemic, and Infectious Diseases.</i>							
1. Enteric Group—							
	(a) Typhoid Fever	..	..	..	..	1	4
	(b) Paratyphoid A.	..	..	..	..	—	—
	(c) Paratyphoid B.	..	..	..	..	3	—
	(d) Type not defined	..	..	..	..	—	—
2.	Typhus	..	..	..	..	—	—
3.	Relapsing Fever	..	..	..	..	51	9
4.	Undulant Fever	..	..	..	..	—	—
5.	Malaria						
	(a) Tertian	..	..	..	..	1,640	779
	(b) Quartan	..	..	..	..	9	—
	(c) Aestivo-autumnal	..	..	..	..	2,091	583
	(d) Cachexia	..	..	..	..	388	303
	(e) Blackwater	..	..	..	..	2	—
	(f) Unclassified	..	..	..	..	1,532	741
6.	Smallpox—	..	..	..	..	2	1
	Alastrim	..	..	..	..	—	—
7.	Measles	..	..	..	..	34	16
8.	Scarlet Fever	..	..	..	..	—	—
9.	Whooping Cough	..	..	..	..	57	57
10.	Diphtheria	..	..	..	..	—	—
11.	Influenza	..	..	..	..	298	68
12.	Military Fever	..	..	..	..	—	—
13.	Mumps	..	..	..	..	22	69
14.	Cholera	..	..	..	..	—	—
15.	Epidemic diarrhoea	..	..	..	..	—	—
16.	Dysentery—						
	(a) Amœbic	..	..	..	..	267	89
	(b) Bacillary	..	..	..	..	19	5
	(c) Undefined or due to other causes	..	..			194	53
17.	Plague—						
	(a) Bubonic	..	..	..	..	—	—
	(b) Pneumonic	..	..	..	..	—	—
	(c) Septicaemic	..	..	..	..	—	—
	(d) Undefined	..	..	..	..	—	—
18.	Yellow Fever	..	..	..	..	17	1
19.	Spirochaetosis ictero-haemorrhagica	..	..			—	—
20.	Leprosy	..	..	..	..	477	264
21.	Erysipelas	..	..	..	..	1	—
22.	Acute Poliomyelitis	..	..	..	..	—	1
23.	Encephalitis Lethargica	..	..	..	..	—	—
24.	Epidemic Cerebro-spinal Fever	..	..	..		2	—
25.	Other Epidemic Diseases—						
	(a) Rubeola (German Measles)	..	..	..		3	—
	(b) Varicella (Chicken-pox)	..	..	..		115	11
	(c) Kala-azar	..	..	..	..	—	—
	(d) Phlebotomus Fever	..	..	..	..	—	—
	(e) Dengue	..	..	..	..	6	—
	(f) Epidemic Dropsy	..	..	..	..	—	—
	(g) Yaws	..	..	..	..	15,283	10,568
	(h) Trypanosomiasis	..	..	..	..	27	16
26.	Glanders	..	..	..	..	—	—
<i>Total carried forward</i>							



<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i> .. .. .		
I.— <i>Epidemic, Endemic, and Infectious Diseases.</i>		
27. Anthrax .. .. .	—	—
28. Rabies .. .. .	—	—
29. Tetanus.. .. .	8	6
30. Mycosis .. .. .	7	—
31. Tuberculosis, Pulmonary and Laryngeal .. .. .	321	108
32. Tuberculosis of the Meninges or Central Nervous System .. .. .	5	2
33. Tuberculosis of the Intestines or Peritoneum .. .. .	2	3
34. Tuberculosis of the Vertebral Column .. .. .	10	3
35. Tuberculosis of Bones and Joints .. .. .	50	15
36. Tuberculosis of other organs—		
(a) Skin or Subcutaneous Tissue (Lupus) .. .. .	—	—
(b) Bones .. .. .	—	—
(c) Lymphatic System .. .. .	10	2
(d) Genito-urinary .. .. .	—	—
(e) Other organs .. .. .	13	3
37. Tuberculosis disseminated—		
(a) Acute .. .. .	2	1
(b) Chronic .. .. .	—	—
38. Syphilis—		
(a) Primary .. .. .	280	86
(b) Secondary .. .. .	208	91
(c) Tertiary .. .. .	399	441
(d) Hereditary .. .. .	34	18
(e) Period not indicated .. .. .	46	25
39. Soft Chancre .. .. .	231	1
40. A.—Gonorrhoea and its complications .. .. .	2,654	403
B.—Gonorrhoeal Ophthalmia .. .. .	43	8
C.—Gonorrhoeal Arthritis .. .. .	99	15
D.—Granuloma Venereum .. .. .	4	1
41. Septicæmia .. .. .	6	—
42. Other Infectious Diseases—		
Trypanosomiasis .. .. .	—	—
II.— <i>General Diseases not mentioned above.</i>		
43. Cancer or other malignant Tumours of the Buccal Cavity.	17	—
44. Cancer or other malignant Tumours of the Stomach or Liver.	1	4
45. Cancer or other malignant Tumours of the Peritoneum Intestines, Rectum.	5	1
46. Cancer or other malignant Tumours of the Female Genital Organs.	—	15
47. Cancer or other malignant Tumours of the Breast	—	4
48. Cancer or other malignant Tumours of the Skin ..	3	2
49. Cancer or other malignant Tumours of Organs not specified.	9	31
50. Tumours non-malignant .. .. .	208	61
51. Acute Rheumatism .. .. .	—	—
52. Chronic Rheumatism .. .. .	3,911	2,302
53. Scurvy (including Barlow's Disease .. .. .	—	—
54. Pellagra .. .. .	3	—
55. Beri-Beri .. .. .	12	1
56. Rickets .. .. .	11	4
57. Diabetes (not including Insipidus) .. .. .	53	39
58. Anæmia—		
(a) Pernicious .. .. .	2	3
(b) Other Anæmias and Chlorosis .. .. .	260	158
<i>Total carried forward</i> .. .. .		

<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i> .. . . .		
<i>II.—General Diseases not mentioned above (contd.)</i>		
59. Diseases of the Pituitary Body .. .. .	—	—
60. Diseases of the Thyroid Gland—		
(a) Exophthalmic Goitre .. .. .	4	5
(b) Other diseases of the Thyroid Glandi Myxœdema.	13	5
61. Diseases of the Para-Thyroid Glands .. .. .	7	2
62. Diseases of the Thymus .. .. .	—	—
63. Diseases of the Supra-Renal Glands .. .. .	1	—
64. Disease of the Spleen .. .. .	60	29
65. Leukæmia—		
(a) Leukæmia .. .. .	8	4
(b) Hodgkin's Disease .. .. .	4	—
66. Alcoholism .. .. .	9	—
67. Chronic poisoning by mineral substances (lead, mercury, etc.).	6	—
68. Chronic poisoning by organic substances (Morphia, Cocaine, etc.)	3	—
69. Other General Diseases—	2	2
Auto-intoxication .. .. .	8	9
Purpura Hæmorrhagica .. .. .	—	—
Hæmophilia .. .. .	1	—
Diabetes Insipidus .. .. .	2	—
<i>III.—Affections of the Nervous System and Organs of the Sense.</i>		
70. Encephalitis (not including Encephalitis Lethargica).	—	—
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal meningitis)	4	4
72. Locomotor Ataxia .. .. .	9	2
73. Other affections of the Spinal Cord .. .. .	8	3
74. Apoplexy—		
(a) Hæmorrhage .. .. .	2	1
(b) Embolism .. .. .	1	1
(c) Thrombosis .. .. .	1	—
75. Paralysis—		
(a) Hemiplegia .. .. .	61	19
(b) Other Paralyzes .. .. .	47	13
76. General Paralysis of the Insane .. .. .	9	—
77. Other forms of mental Alienation .. .. .	24	2
78. Epilepsy .. .. .	80	27
79. Eclampsia Convulsions (non-puerperal) five years or over.	1	2
80. Infantile Convulsions .. .. .	21	11
81. Chorea .. .. .	4	4
82. A.—Hysteria .. .. .	12	24
B.—Neuritis .. .. .	305	92
C.—Neurasthenia .. .. .	118	62
83. Cerebral Softening .. .. .	—	—
84. Other affections of the Nervous System such as Paralysis Agitans.	258	98
85. Affections of the Organs of Vision—		
(a) Diseases of the Eye .. .. .	115	44
(b) Conjunctivitis .. .. .	2,173	1,026
(c) Trachoma .. .. .	43	16
(d) Tumours of the Eye .. .. .	7	4
(e) Other affections of the Eye .. .. .	603	145
<i>Total carried forward</i> .. .. .		

Diseases.						Male.	Female.
Brought forward .. .. .							
III.—Affection of the Nervous System and Organs of the Senses (contd.)							
86.	Affections of the Ear or Mastoid Sinus .. ..					826	379
IV.—Affections of the Ear or Mastoid Sinus							
87.	Pericarditis .. .. .					6	1
88.	Acute Endocarditis or Myocarditis .. .. .					37	2
89.	Angina Pectoris .. .. .					2	2
90.	Other Diseases of the Heart—						—
	(a) Valvular—						
	Mitral .. .. .					143	73
	Aortic .. .. .					24	4
	Tricuspid .. .. .					2	2
	Pulmonary .. .. .					2	2
	(b) Myocarditis .. .. .					76	30
91.	Diseases of the Arteries—						
	(a) Aneurism .. .. .					11	1
	(b) Arterio-Sclerosis .. .. .					6	2
	(c) Other diseases .. .. .					29	16
92.	Embolism or Thrombosis (non-cerebral) .. ..					—	—
93.	Diseases of the Veins—						
	Hæmorrhoids .. .. .					263	85
	Varicose Veins .. .. .					26	3
	Phlebitis .. .. .					7	2
94.	Diseases of the Lymphatic System—						
	Lymphangitis .. .. .					158	29
	Lymphadenitis, Bubo (non-specific) .. ..					176	30
95.	Hæmorrhage of undetermined cause .. .. .					7	1
96.	Other affections of the Circulatory System ..					21	9
V.—Affections of the Respiratory System.							
97.	Diseases of the Nasal Passages— .. .. .					12	1
	Adenoids .. .. .					30	4
	Polypus .. .. .					9	—
	Rhinitis .. .. .					82	39
	Coryza .. .. .					513	129
98.	Affections of the Larynx						
	Laryngitis.. .. .					170	51
99.	Bronchitis—						
	(a) Acute .. .. .					3,008	1,437
	Chronic .. .. .					2,225	387
100.	Broncho-Pneumonia .. .. .					97	36
101.	Pneumonia—						
	(a) Lobar .. .. .					266	64
	(b) Unclassified .. .. .					76	20
102.	Pleurisy Empyema .. .. .					293	68
103.	Congestion of the Lungs .. .. .					7	4
104.	Gangrene of the Lungs .. .. .					—	—
105.	Asthma .. .. .					100	41
106.	Pulmonary Emphysema .. .. .					2	1
107.	Other affections of the Lungs—					13	11
	Pulmonary Spirochaetosis .. .. .					—	1
VI.—Diseases of the Digestive System.							
108.	A.—Diseases of Teeth or Gums, Caries, Pyorrhœ, etc.					1,405	702
	B.—Other affections of the Mouth—						
	Stomatitis.. .. .					240	142
	Glossitis, etc. .. .. .					123	60
Total carried forward .. .. .							



Diseases.	Male.	Female.
Brought forward .. .. .		
VI.—Diseases of the Digestive System.		
109. Affections of the Pharynx or Tonsils—		
Tonsillitis .. .. .	290	111
Pharyngitis .. .. .	222	74
110. Affections of the Œsophagus.. .. .	2	1
111. A.—Ulcer of the Stomach .. .. .	14	8
B.—Ulcer of the Duodenum .. .. .	13	3
112. Other affections of the Stomach— .. .. .	4	2
Gastritis .. .. .	482	258
Dyspepsia etc. .. .. .	711	334
113. Diarrhoea and Enteritis— .. .. .		
Under two years .. .. .	319	229
114. Diarrhoea and Enteritis— .. .. .		
Two years and over .. .. .	1,250	471
Colitis .. .. .	149	33
Ulceration .. .. .	32	9
114a.Sprue .. .. .	—	—
115. Ankylostomiasis .. .. .	100	76
116. Diseases due to Intestinal Parasites—		
(a) Cestoda (Tænia) .. .. .	542	161
(b) Trematoda (Flukes) .. .. .	71	16
(c) Nematoda (other than Ankylostoma)—		
Ascaris .. .. .	293	175
Trichocephalus dispar .. .. .	—	—
Trichina .. .. .	48	20
Dracunculus .. .. .	858	122
Strongylus .. .. .	2	—
Oxyuris .. .. .	6	2
(d) Coccidia .. .. .	—	—
(e) Other parasites .. .. .	49	23
(f) Unclassified .. .. .	40	19
117. Appendicitis .. .. .	21	6
118. Hernia .. .. .	312	13
119. A.—Affections of the Anus, Fistula, etc. .. .. .	110	35
B.—Other affections of the Intestines— .. .. .	1	2
Enteroptosis .. .. .	—	—
Constipation .. .. .	7,067	1,292
120. Acute Yellow Atrophy of the Liver .. .. .	—	—
121. Hydatid of the Liver .. .. .	1	—
122. Cirrhosis of the Liver— .. .. .		
(a) Alcoholic .. .. .	1	—
(b) Other forms .. .. .	13	3
123. Biliary Calculus .. .. .	1	1
124. Other affections of the Liver— .. .. .	7	3
Abscess .. .. .	92	18
Hepatitis .. .. .	154	57
Cholecystitis .. .. .	4	1
Jaundice .. .. .	42	9
125. Diseases of the Pancreas .. .. .	—	—
126. Peritonitis (of unknown cause) .. .. .	17	3
127. Other affections of the Digestive System .. .. .	161	93
VII.—Diseases of the Genito-urinary System (non-Vene-		
real).		
128. Acute Nephritis .. .. .	178	89
129. Chronic do. .. .. .	115	37
130. A.—Chyluria .. .. .	—	—
Total carried forward .. .. .		

<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i> .. .. .		
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i>		
B.—Schistosomiasis .. .. .	152	18
131. Other affections of the Kidneys— .. .. .	6	1
Pyelitis, etc. .. .. .	25	4
132. Urinary Calculus .. .. .	11	—
133. Diseases of the Bladder— .. .. .	4	—
Cystitis .. .. .	312	97
134. Diseases of the Urethra— .. .. .		
(a) Stricture .. .. .	276	3
(b) Other .. .. .	169	4
135. Diseases of the Prostate— .. .. .		
Hypertrophy .. .. .	1	—
Prostatitis .. .. .	54	—
136. Diseases (non-Venereal) of the Genital Organs of Man, .. .. .	70	—
Epididymitis .. .. .	84	—
Orchitis .. .. .	217	—
Hydrocele .. .. .	167	—
Ulcer of Penis .. .. .	241	—
Phimosis and Paraphimosis .. .. .	106	—
137. Cysts or other non-malignant Tumours of the Ovaries. .. .. .	—	9
138. Salpingitis— .. .. .	—	16
Abscess of the Pelvis .. .. .	—	39
139. Uterine Tumours (non-malignant) .. .. .	—	27
140. Uterine Hæmorrhage (non-puerperal) .. .. .	—	16
141. A.—Metritis .. .. .	—	187
B.—Other affections of the Female Genital Organs— .. .. .	—	178
Displacements of Uterus .. .. .	—	102
Amenorrhœa .. .. .	—	109
Dysmenorrhœa .. .. .	—	222
Leucorrhœa .. .. .	—	99
142. Diseases of the Breast (non-puerperal)— .. .. .	—	6
Mastitis .. .. .	—	66
Abscess of Breast .. .. .	—	26
VIII.— <i>Puerperal State.</i>		
143. A.—Normal Labour .. .. .	—	59
B.—Accidents of Pregnancy— .. .. .		
(a) Abortion .. .. .	—	73
(b) Ectopic Gestation .. .. .	—	7
(c) Other accidents of Pregnancy .. .. .	—	19
144. Puerperal Hæmorrhage .. .. .	—	5
145. Other accidents of Parturition .. .. .	—	11
146. Puerperal Septicæmia .. .. .	—	6
147. Phlegmasia Dolens .. .. .	—	2
148. Puerperal Eclampsia .. .. .	—	1
149. Sequelæ .. .. .	—	4
150. Puerperal affection of the Breast .. .. .	—	3
IX.— <i>Affections of the Skin and Cellular Tissues.</i>		
151. Gangrene .. .. .	9	6
152. Boil— .. .. .	407	107
Carbuncle .. .. .	402	78
153. Abscess— .. .. .	534	139
Whitlow .. .. .	351	110
Cellulitis .. .. .	762	441
<i>Total carried forward</i> .. .. .		

<i>Diseases.</i>						<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i> .. .. .							
IX.— <i>Affections of the Skin and Cellular Tissues (contd.)</i>							
154. A.—Tinea .. .. .						604	204
B.—Scabies .. .. .						775	308
155. Other Diseases of the Skin—						193	94
Erythema .. .. .						115	34
Urticaria .. .. .						152	62
Eczema .. .. .						727	316
Herpes .. .. .						96	24
Psoriasis .. .. .						62	17
Elephantiasis .. .. .						172	53
Myiasis .. .. .						9	2
Chiggers .. .. .						28	22
Cutaneous Leishmaniasis .. .. .						—	—
Ulcers .. .. .						5,191	2,746
X.— <i>Diseases of Bones and Organs of Locomotion (other than Tuberculous).</i>							
156. Diseases of Bones—							
Osteitis .. .. .						322	137
157. Diseases of Joints—							
Arthritis .. .. .						994	299
Synovitis .. .. .						482	95
158. Other Diseases of Bones or Organs of Locomotion						1,592	293
XI.— <i>Malformations.</i>							
159. Malformations—							
Hydrocephalus .. .. .						7	—
Hypospadias .. .. .						—	—
Spina Bifida, etc. .. .. .						11	5
XII.— <i>Diseases of Infancy.</i>							
160. Congenital Debility .. .. .						9	4
161. Premature Birth .. .. .						1	2
162. Other affections of Infancy .. .. .						39	41
163. Infant neglect (infants of three months or over) ..						3	2
XIII.— <i>Affections of Old Age.</i>							
164. Senility—						25	21
Senile Dementia .. .. .						60	13
XIV.— <i>Affections produced by External Causes.</i>							
165. Suicide by Poisoning .. .. .						—	—
166. Corrosive Poisoning (intentional) .. .. .						—	—
167. Suicide by Gas Poisoning .. .. .						—	—
168. Suicide by Hanging or Strangulation .. .. .						4	—
169. Suicide by Drowning .. .. .						—	—
170. Suicide by Firearms .. .. .						1	—
171. Suicide by cutting or stabbing Instruments .. .. .						4	—
172. Suicide by jumping from a height .. .. .						—	—
173. Suicide by crushing .. .. .						—	—
174. Other Suicides .. .. .						—	—
175. Food Poisoning—						3	—
Botulism .. .. .						8	1
176. Attacks of poisonous animals—							
Snake Bite .. .. .						35	4
Insect Bite .. .. .						75	16
<i>Total carried forward</i> .. .. .							



<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i> .. .. .		
XIV.— <i>Affections produced by External Causes.</i>		
177. Other accidental Poisonings .. .. .	5	9
178. Burns (by Fire) .. .. .	109	35
179. Burns (other than by Fire) .. .. .	47	11
180. Suffocation (accidental) .. .. .	1	—
181. Poisoning by Gas (accidental) .. .. .	—	1
182. Drowning (accidental) .. .. .	1	—
183. Wounds (by Firearms war excepted) .. .. .	72	5
184. Wounds (by cutting or stabbing Instruments) .. .. .	3,621	718
185. Wounds (by Fall) .. .. .	1,345	183
186. Wounds (in Mines or Quarries) .. .. .	60	—
187. Wounds (by Machinery) .. .. .	62	8
188. Wounds (crushing, <i>e.g.</i> railway accidents, etc.) .. .. .	502	63
189. Injuries inflicted by Animals Bites, Kicks, etc. .. .. .	119	28
190. Wounds inflicted on Active Service .. .. .	—	—
191. Executions of civilians by belligerents .. .. .	—	—
192. A.—Over fatigue .. .. .	1	1
B.—Hunger or Thirst .. .. .	2	—
193. Exposure to Cold, Frost bite, etc. .. .. .	—	—
194. Exposure to Heat—		
Heatstroke .. .. .	—	—
Sunstroke .. .. .	—	—
195. Lighting Stroke .. .. .	—	—
196. Electric Shock .. .. .	—	—
197. Murder by Firearms .. .. .	2	1
198. Murder by cutting or stabbing Instruments .. .. .	2	2
199. Murder by other means .. .. .	—	—
200. Infanticide (Murder of an infant under one year)	—	—
201. A —Dislocation .. .. .	69	10
B.—Sprain .. .. .	698	108
C.—Fracture .. .. .	203	37
202. Other external Injuries .. .. .	1,142	257
Rape .. .. .	—	5
203. Deaths by Violence of unknown cause .. .. .	—	—
XV.— <i>Ill-Defined Diseases.</i>		
204. Sudden Death (cause unknown) .. .. .	9	—
205. A.—Diseases not already specified or ill-defined—		
Ascites .. .. .	19	11
Œdema .. .. .	71	30
Asthenia .. .. .	208	85
Shock .. .. .	—	1
Hyperpyrexia .. .. .	11	—
B.—Malingering .. .. .	120	45
XVI.— <i>Diseases the total of which have not caused 10 Deaths.</i>	352	230
<i>Total</i> .. .. .	84,803	35,839
		84,803
	<i>Total</i> ..	120,642

# APPENDIX A.

## HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Colony.	Hospital.		European.				African.				Dispensaries.	Medical Staff. (Medical Officers and Women Medical Officers.)	Remarks.
	Euro- pean.	Afri- can.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Accra .. ..	1	1	17	3	17	153	50	181	50	2	5 (M.O.'s)	A children's Hospital.  Infant Welfare Clinic. Prince of Wales' College.  Infant Welfare Clinic. do. visited by W.M.O.  Insufficient accommo- dation.	
" Cantonments ..	—	1	—	—	—	6	—	6	—	1	1 (M.O.)		
" Maternity ..	—	1	—	—	—	—	15+14 cots	—	15+14 cots	—	1 (W.M.O.)		
" Princess M. Louise ..	—	1	—	—	—	—	14 cots	—	14 cots	1	1 (W.M.O.)		
" Christiansborg ..	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)		
" Achimota ..	—	1	—	—	—	10	10	10	10	1	1 (M.O.)		
Sekondi ..	1	1	17	4	17	25	5	23	5	1	2 (M.O.'s)		
" ..	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)		
" Chama ..	—	—	—	—	—	—	—	—	—	1	1 (M.O.)		
Cape Coast ..	1	1	5	—	6	19	6	13	9	1	1 (M.O.)		
Saltpond ..	—	1	—	—	—	5	2	8	2	1	1 (M.O.)		
Winneba ..	1	1	6	2	6	13	7	10	6	1	1 (M.O.)		
Ada ..	—	1	—	—	—	4	4	8	4	1	1 (M.O.)		
Keta.. ..	—	1	—	—	—	12	4	12	4	1	1 (M.O.)		
Kibi ..	—	1	—	—	—	14	4	15	4	1	1 (M.O.)		
Mpraeso ..	—	1	—	—	—	5	—	5	—	1	1 (M.O.)		
Dunkwa ..	—	1	—	—	—	10	4	10	4	1	1 (M.O.)		

APPENDIX A—*contd.*

HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Colony.	Hospital.		European.				African.				Medical Staff.	Remarks.
	Euro- pean.	Afri- can.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.			
			M.	F.	M.	F.	M.	F.	M.	F.		
Tarkwa	—	1	—	—	—	—	9	—	11	—	1 (M.O.)	Not yet staffed.  (Visiting from C. Coast.)  *One bed on verandah.
Axim	1	—	4	1	4	1	8	2	8	2	1 (M.O.)	
Wioso	—	1	—	—	—	—	4	—	4	—	—	
Akuse	—	1	—	—	—	3	8	6	11	6	1 (M.O.)	
Koforidua	—	1	—	—	—	6	14	—	12	—	1 (M.O.)	
Elmina	—	1	—	—	—	—	—	4	—	4	1 (M.O.)	
Oda	—	1	—	—	—	—	12	—	12	—	1 (M.O.)	
Nsawam	—	1	—	—	—	—	4*	—	3	—	1 (M.O.)	
Total	5	22	49	10	50	10	335	125+28	ts. 362	ts. 25	27	



APPENDIX A.—contd.

HOSPITAL BED ACCMmodation AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Ashanti.	Hospital.		European.				African.				Dispen- saries.	Medical Staff.	Remarks.
	Euro- pean.	Afri- can.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Kumasi ..	I	I	10	2	10	2	97	35+2 cots	104	35+2 cots	I	3 (M.O's)	Infant Welfare Centre.  Mines Medical Officer.]
" ..	—	I	—	—	—	—	—	20 cots	—	—	I	I (W.M.O.)	
Bekwai ..	—	I	—	—	—	—	4	—	4	—	I	I (M.O.)	
Sunyani ..	—	I	—	—	—	—	6	2	6	4	I	I (M.O)	
(Obuasi) ..	—	I*	—	—	—	—	—	—	—	—	(I)	(I)	
Kintampo ..	—	I	—	—	—	—	9	—	12	4	I	I (M.O.)	
Total ..	I	5	10	2	10	2	116	37+22 cots	126	43+22 cots	5	7	

\*Mines Hospital.

Northern Territories.		Euro- pean.	Afri- can.	M <sub>2</sub>	F.	M.	F.	M.	F.	M.	F.		
Tamale .. ..	I	—	I	4	2	6	2	20	4	20	4	2 (M.O's)	
Wa .. ..	—	—	I	—	—	—	—	18	—	18	3	I (M.O.)	
Zuarungu .. ..	—	—	I	—	—	—	—	8	—	8	—	I (M.O.)	
Salaga .. ..	—	—	I	—	—	—	—	6	2	8	2	I (M.O.)	
Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	—	I (M.O.)	
Total .. ..	I	4	4	4	2	6	2	26	6	54	9	5	6

APPENDIX A.—*contd.*

HOSPITAL BED ACCOMMODATION AND DISPENSARIES FOR GOLD COAST COLONY, ASHANTI,  
NORTHERN TERRITORIES AND BRITISH MANDATED TOGO.

Mandated Togo.	Hospital.		European.				African.				Medical Staff.	Dispensaries.	Remarks.
	European.	African.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.				
			M.	F.	M.	F.	M.	F.	M.	F.			
Ho ..	—	1	—	—	—	—	8	3	8	3	1 (M.O.)	1	
Kete Krachi ..	—	—	—	—	—	—	—	—	—	—	1 (M.O.)	1	
Yendi ..	—	—	—	—	—	—	—	—	—	—	1 (M.O.)	1	
Total ..	—	1	—	—	—	—	8	3	8	3	3	3	

Contagious Diseases Hospitals.	European.		African.		European.				African.				Staff.	Visiting.
	European.	African.	Total Beds at present.		Number of Beds assigned.		Total Beds at present.		Number of Beds assigned.					
			M.	F.	M.	F.	M.	F.	M.	F.				
Labadi ..	—	1	—	—	—	—	24	—	24	—	24	—	(1 M.O.H.)	Visiting.
Cape Coast ..	—	1	—	—	—	—	28	—	29	—	29	—	(1 M.O.H.)	"
Sekondi ..	—	1	—	—	—	—	26	24	26	24	26	24	(1 M.O.H.)	"
Tarkwa ..	—	1	—	—	—	—	1	—	1	—	1	—	(1 M.O.H.)	"
Winneba ..	—	1	—	—	—	—	8	6	8	6	8	6	(1 M.O.H.)	"
Ada ..	—	1	—	—	—	—	8	—	8	—	8	—	(1 M.O.H.)	"
Saltpond ..	—	1	—	—	—	—	6	—	6	—	6	—	(1 M.O.H.)	"
Kumasi ..	—	1	—	—	—	—	38	36	38	36	38	36	(1 M.O.H.)	"
Total ..	—	8	—	—	—	—	139	66	140	66	140	66	—	
Grand Total ..	7	40	63	14	66	14	624	237+50 cots	690	252+50 cots	38	43		

## APPENDIX B.

## REPORT ON CASES OF TRYPANOSOMIASIS TREATED WITH BAYER 205,

BY DR. G. F. T. SAUNDERS, M.O., KINTAMPO.

1. *Old Cases.*—In a previous report from this station dated 22/2/26, three cases were classified as apparently cured. Of these two (Nos. 1 and 15) have died of sleeping sickness. The third (No. 12) has definitely relapsed. He was given two further injections of Bayer in September, 1927, with some slight benefit.

Of the six cases reported as improved, all have since died, although one of them (No. 14) was quite free from symptoms on 29/3/27.

The case reported as not improved has died.

The summary given in February, 1926, was as follows:—

Apparently cured	...	...	3
better	...	...	6
Non-cure			
worse	...	...	1
Died	...	...	4
Unknown	...	...	2
			—
			16
			—

At present, after another two years' observation, the figures stand thus:—

Apparently cured	...	...	Nil
Non-cure (better)	...	...	1
Died	...	...	13
Unknown	...	...	2
			—
			16
			—

In considering these cases, one should bear in mind:—

- That all had symptoms indicating involvement of the central nervous system.
- That one moribund case got a year's extension of fairly healthy life; that in the majority of cases marked improvement followed the treatment.
- That permanent sterilisation of the peripheral blood occurred in all cases but one, presumably reducing the amount of infection.

## NEW CASES TREATED INTRAVENOUSLY.

## CASE NO. 17.

JOSEPH AMADU. Male, about 40, married. On 24/2/26, he complained of pain all over, getting fat, and sleepiness for one month. He had had lumps in his neck for one year. Previously occasional headaches. He had lived all his life at Kyeramankuma, near Kintampo. Blood showed eosinophilia and polyochromatophilia; subtain and quartan parasites were found later.

Urine normal. Fæces negative. Trypanosomes were found on gland puncture.

He was given four injections of Bayer 205 gm 1 at short intervals and quinine gr. 5 t.i.d. From May to July, he got three injections of gr. 1 and one of gr. 2 at irregular intervals; also three injections of N.A.B., and a course of Mist Specific, followed by K.I. On September 1st and September 9th, he was given Bayer gm. 1.

Considerable improvement followed. His sleepiness stopped, but he was never quite normal. On September 23rd, his sleepiness relapsed, and he became weak-minded. On October 4th, he was put on Antimony Tartarate by mouth gr. 1½ daily in plenty of water, increased to gr. 2 on the 12th. On 25th, Intravenous



Antimony was substituted, in ascending doses, from gr.  $\frac{1}{4}$ . When an injection of gr. 2 was given, it was followed at once by severe pain in chest and coughing. The next injection was followed by an injection of Ametox gr. 3, in the hope that it might control these symptoms. It had no effect on them. His mental symptoms became more pronounced now. He became sleepless and talkative at night. In November, he retrogressed still further. He had a constant gross tremor; he mumbled to himself all day, sometimes praying for his sins to be forgiven, sometimes gesticulating as if preaching. Neither hyoscine nor the catechist were able to calm him. On November 24th, he was given Atoxyl gr. 3 intramuscular. On November 26th, an attempt was made at lumbar puncture, with the intention of trying intrathecal medication. He resisted this violently, ran away, and did not return. In March, he died.

Small quantities of albumen were found in the urine of this case, with occasional intervals of normal urine. There was no other sign of nephritis.

#### CASE NO. 18.

\*Akanvibri Frafra. Male. Age 26. Ex-soldier

Brought in unconscious 30/5/26.

Had previously been discharged from the Gold Coast Regiment with symptoms of mental dullness.

In partial coma. Malaria S.T. found in blood.

Given quinine. On 7/6/26, trypanosomes were found in blood.

Given Bayer 205 gm. 5, and as follows:—

9 /VI	Bayer 205	gm 1.	Improving.
15 /VI	Bayer 205	gm 1.	
19 /VI	N. A. B.	gm	
25 /VI	Bayer 205	gm 1.5	
30 /VI	"	gm 2	
1 /VII	"	gm 2	
7 /VII	"	gm 2	
10 /VII	"	gm 2.5	
15 /VII	"	gm 3	
30 /VII	"	gm 1	
9 /IX	"	gm 1	

On 15/9/26, he seemed to be normal; no glands were palpable, and he was discharged.

On 14/10/26, he was admitted with relapse of sleepiness, and was put on Antimony Tartarate by mouth. Blood shewed eosinophilia, anisocytosis, and polychromatophilia. Stool contained Hookworm ova, *Strongyloides*, *Entamaeba histolytica* and *E. coli*.

After thymol treatment a *Tænia* was evacuated.

On October 23rd he was put on intravenous Antimony instead of by mouth. As he was having occasional attacks of diarrhoea he was given Emetin gr 1 nightly for 10 nights by hypodermic. He died on November 7th.

#### AUTOPSY.

*Heart*.—Pericardial fluid excessive. Muscle pale.

*Lungs*.—Pleural adhesion at left apex. Old scars left apex. Penumonic patches along anterior border of left lung. Large lymph gland between lobes

*Digestive*.—Patches of inflammation and congestion in small intestine.

*Spleen*.—Chocolate colour.

*Urinary*.—Patches of congestion on cortex of right kidney.

*Liver*.—Light yellowish brown with patches of normal colour. On section, light yellowish brown.

*Helminths*.—*Ascaris* in small intestine.

*Porocephalus* larvæ, on superior surface of liver, in small intestine (embedded in wall), and in apex of left lung.

The Director of Medical Research Institute reported as follows on the histology :—

*Spleen*.—Marked congestion.

*Bronchial Gland*.—Hæmorrhagic destruction and fibrotic changes.

*Liver*.—Completely disintegrated; lobular arrangement and columns had disappeared—Much necrosis of cells and what survived showed marked fatty degeneration.

*Kidney*.—Tubular cells granular and cloudy; nuclei poorly staining. Most vasa recta engorged; no definite hæmorrhages; some thickening of fibrous tissue round vessels; fat, a trace.

*Lungs*.—Thickening of alveolar walls—dilation of vessels with hæmorrhages into spaces—Emphysema.

*Brain*.—Typical of sleeping Sickness, *i.e.* Perivascular lymphatic cell infiltration.

#### CASE NO. 19.

Sediki Moshie. Male. Age about 25. Soldier

21/7/26 Headache, fever, and adenitis. Trypanosomes and S.T. parasites in blood.

22/VII	Bayer 205	gm .5
24/VII	„	gm 1
26/VII	„	gm 1
29/VII	„	gm 1.5
31/VII	„	gm 2.5
2/VIII	„	gm 3
30/VIII	Discharged, apparently normal; no glands palpable.	
3/IX	Relapse of symptoms. Glands palpable. Bayer 205 gm. 1.	
14/IX	Normal; no glands; discharged.	
14/X	relapse. Bayer 205 gm 1.	
21/X	Bayer 205 gm 1.	
3/XI	Gland palpable. Bayer 205 gm 1.	
10/XI	Night fever. No glands.	
16/XI	Gland palpable. Antim. Tart. gr $\frac{1}{4}$ intravenous.	
22/XI	Antim. Tart. gr $\frac{1}{4}$ Intravenous.	
25/XI	No palpable gland. Apparently normal.	

#### CASE NO. 20.

Asana Chokosi. Female. Age circ. 35. Soldier's wife.

Was in hospital for about a month in Kumasi with Fever. On 30/12/25, admitted to hospital at Kintampo with cough and fever; very toxaemic and hot. very weak. She slept all day. She was treated with quinine and a sedative expectorant; very soon she got much better and was discharged. apparently normal, on 6/1/26. On 21/7/26, she was re-admitted in coma with sub-normal temperature. Malaria was found in her blood. Quinine was injected twice daily, and emetin gr  $\frac{1}{2}$  p.d. for 9 days. Bayer 205 was begun on 11th;  $\frac{1}{2}$ , 1, and 2 gm on the 1st, 3rd and 5th days. On partial recovery she was put on Mist Ferri et Arsen, t.i.d.

On 21/8/26, she was discharged much improved

On 24/9/26, she was brought back relapsed. She had been very cold and unable to walk without help for two days.

Gait very weak and unsteady. Mouth dribbling; had to be hand-fed. Hard glands right side of neck. Very cold. Abdomen hollow. Round umbilicus a few moderately large papules with scabs on top. Bad pyorrhoea; fine tremor of tongue. Lay in lethargy, with eyes closed. When roused, opens eyes languidly, then let them fall closed again. When spoken to, remains inactive for about thirty seconds then answers indistinctly or slowly takes action.



Liver enlarged upwards. Heart impulse not visible or palpable sounds weak. Temperature sub-normal; pulse 66, weak; respirations 24.

Abdomen rather rigid; liver not palpable. Spleen not enlarged.

Knee jerks brisk. Babinski on right side. After a few days oedema of legs and severe cough developed.

She died on 3/10/26.

#### CASE NO. 21.

David Gaisie. Male, about 12. Schoolboy.

31/8/26, Complains of sleepiness, 3 months or more; also griping, headache, and fever. Getting stupid. Previous crawl-crawl and yaws.

Lived 2 miles S. of Kintampo; has visited Tanko, (the village where Nos. 5, 11 and 22 were infected), about 5 months before.

Head slightly dirty. Typical neck and supraclavicular glands, hard gland in left axilla and left groin. Slight chorea. Disseminated papulse, pustules, and small scars. Temperature 99.8, pulse 97, irregular in volume and rate, occasional missed beats, Respirations 18; slight cough; bronchial fremitus. Patch of dullness in right mid-auxillary line in lower third.

Chest prominent Spleen one-third way to navel, liver slightly enlarged downwards.

Blood negative.

Treated with Bayer 205 intravenously gm  $\frac{1}{2}$ ; three doses at short intervals followed by two more at weekly or longer intervals. His symptoms were relived. except that irregular fever continued.

Hookworm ova were found on 23/9; thymol treatment was given. Bayer was given in weekly gm  $\frac{1}{2}$  doses until 10 were given. He was discharged on 1/12/26, and still with temperature, which had not been affected either by Bayer or by quinine. He died of sleeping sickness in 1927.

#### CASE NO. 22.

Kwesi Tawiya. Male, about 25. Weaver.

1/9/26. Complains of "weakness during the night" for 4 months. Getting thin; fever; headaches.

Three years ago he had lumps in the neck, cured by native treatment. Two years ago he had sleeping sickness, cured by native treatment.

Case No. 5 is his nephew. Both had lived at Tanko. Slight downward enlargement of liver; right rectus rather more rigid than left.

Fæces hookworm. Blood negative.

On 13th September, he was given one injection of Bayer 205 gm. 1. This stopped the fever from which he had suffered since admission. Thymol treatment was given on 29th. No more Bayer was on hand. On 2/10/27, he ran away after an emotional outburst. He died of sleeping sickness in 1927.

#### CASE NO. 23.

Effua Donkor. Female, about 30. Housewife.

15th October, 1926. Complains of pain in joints about three years. Catechist thinks sleeping sickness. Husband died of it. Dull-looking; tongue slightly coated. Slight pyorrhoea lower jaw. Speech slow. Getting fat lately. Urine, blood, faces, negative. Manner suggestive of sleeping sickness; whining voice, foolish talk. On 27th a trypanosome was found by lumbar puncture.

Treated with three injections of Bayer 205 gm. 1 on alternative days. The first injection was subcutaneous and caused severe pain. The second was intravenous, and was followed by urticaria. A fourth injection was given on 23/9, she was now greatly improved and cheerful. On 5/11, she was discharged apparently normal; no albuminuria. In December she died, with anasarca.



## CASE NO. 24.

Mamadu Moshi. Male, about 40. Labourer.

On 30th September 1926, he complained of headache and pain all over, with evening fever. He was anæmic. His only previous illness was frequent headache since childhood. His blood showed eosinophilia, an excess of large mononuclear cells, and polychromasia. He had been on quinine for one month; he was admitted and quinine continued. In spite of this his temperature rose to 103.6 on the evening of the 30th, and a trypanosome was found in a fresh blood preparation.

Previous to illness he had been employed as a labourer by the Medical Officer and the District Commissioner. He was a very reliable and quick messenger. He used to bring water to the hospital from a tsetse focus which had been cleared but he used sometimes to leave his vessel and wander about the uncleared area.

Slightly enlarged soft gland on left side of neck. Slight pyorrhœa. Unable to elicit knee jerk.

After some days afebrile, he had another attack on 5/10/26, with filaria and abundant trypanosomes in peripheral blood. On 12th Bayer 205 was injected. On the morning after he had a sensation of something pricking the soles of his feet. The Bayer was repeated on the 14th and 16th, and two further injections given at weekly intervals. On November 4th he was discharged apparently normal and has remained normal and healthy since.

## CASE NO. 25.

Amigahara Zouaragu. Male, about 24. Soldier.

While on manœuvres he had an attack of fairly severe fever with dizziness. The fever resisted quinine. He was brought in and admitted to hospital. His blood was negative for both trypanosomes and malaria. His fever stopped but dizziness continued and was unaffected by syringing his ears or by bromides. Lumbar puncture gave a cell count of 1,050 cells per c. mm; but repeated blood examinations revealed no trypanosomes. On 1st, 3rd, and 5th March, 1927, he was given 1 gm of Bayer, and two more at weekly intervals.

He states that he had previously had sleeping sickness and was cured; but that dizziness and headache had persisted for 3 years previous to his admission.

Some improvement followed the treatment, but he relapsed and was discharged from the army as unfit. His present condition is unknown.

## CASE NO. 26.

Yeriya Dagarti. Male, about 30. Labourer.

An advanced somnolent case and some improvement by the usual course of five injections, and he is now reported to be in fair health and working as a farm labourer.

## CASE NO. 27.

Jawiri Bagonji. Female, about 30

An advanced somnolent case, febrile.

Fainted during examination. Typical glands in neck. No trypanosomes were found in fresh blood.

Three injections of gm 1 were given, on the 21st, 24th, and 26th March, 1927.

After the second injection she spat yellow fluid with some blood. She did not attend further.

Considerable improvement followed the treatment, and the disease seems to be stationary now.

## CASE NO. 28.

Ama Amoatana. Female, about 30.

Came 5/4/27, complaining of headache and pain in chest for one month. Gait and manner were typical of sleeping sickness. Face bloated, small hard glands in neck, and in both epitrochlear and inguinal regions.

Slight anæmia, mouth not sore. Spleen 1 finger, liver normal. Knee jerk feeble R, absent L. Babinski's sign positive on R; feeble on L, apparently extensor.

Ankle and pupil reflexes normal. Has lived at Tanko all her life; an endemic area.

Bayer 205 gm 1 was injected on the 5th and again on 7th of April. She did not come again until October 6th. She reported considerable improvement, which indeed was still visible. Four further injections were given at weekly intervals, with further slight improvement. The disease is now stationary.

#### CASE NO. 29.

Musa Dagomba. Male, about 45.

On 6/9/27, he was brought in complaining of somnolence and general pains. Very ataxic; led like one blind.

Tremulous and dribbling at mouth. Head held forward and to one side. Typical glands in neck. Lipoma tumour over deltoid. Mass of glands left femoral region. Left foot oedematous. Spontaneous clonus of thigh muscles. Left eye closed more than right. P 96, weak. Abdomen full, spleen palpable. Knee jerk brisk. Pyrrhoea.

Born Gambaga: been to Kumasi and the kola country as carrier.

Fresh blood film and Leishman film negative.

Bayer gm 1 was given on 6th and 8th of April. Did not attend again till he died on 13th September, 1927.

#### CASE NO. 30.

Mechemeny Grunshi. Male, about 19, firewood seller.

Admitted on 4th June, 1927, with advanced sleeping sickness. Weak and thin, very somnolent. Speech defective, mentally rather slow. Pulse strong and steady, rate subnormal. Temperature subnormal, respiration slow. Clubbed fingers. Anaemic. Tongue slightly coated on dorsum. Gums inflamed; slight pyorrhoea. Abdomen carinate.

Skin dry and atrophic all over. Small bony nodule over distal end of ulna. Scars and papules on abdomen; minute scars on chest and back. Itchy all over. Typical glands neck. Enlarged glands groin.

Breath sounds inaudible over left base behind. Heart sounds weak. No knee jerk, no ankle clonus. Babinski positive R, no plantar reflex L; no abdominal reflex. Cremasteric reflex present. Pupils react to light.

A healing ulcer on left ankle.

He was observed in hospital for three weeks; trypanosomes were not found but the sleep symptoms were typical. On June 27th, 29th and July 1st, Bayer gm 1 was given. The sleep symptoms became more marked, but improved again in about 3 days. Marked improvement followed the fourth injection. He was discharged at his own request, greatly improved, on 5th August. He died of sleeping sickness on 25th October.

#### CASE NO. 31.

Akosua Maadah. Female, about 35. Married.

An advanced stuporous case, with gross tremors.

Stated that disease had a sudden onset about 1 month ago, in Wenchi district.

Injected with 1 gm Bayer on June 21st, 1927; died on 28th.

#### CASE NO. 32.

Ageteboya Moshi. Male, about 30. Farm labourer.

Complains of pain all over. Began about ten years ago. First a skin disease "like leprosy"; then "went into his bones." Occasional fever. Had gonorrhoea about 6 years ago. Addicted to palm wine in excess. No spirits. Born in Moshi. Has travelled a lot in Ashanti.



Pustules, papules, small ulcers all over. Very itchy. Gait clumsy; takes a few steps very slowly, then runs a little; legs apart more than normal; feet put down with deliberation; sometimes gets dizzy and falls. Well nourished. Slight anæmia. Speech slurred. Typical glands in neck. Gums red and pus discharging from margin.

Nothing abnormal chest, abdomen, or nervous system, except brisk knee jerks.

Very somnolent during his stay in hospital. His severe itching did not react to any method of treatment.

On June 27th and 29th and July 1st he was injected with Bayer 205, gm 1. He slept more after the Bayer, and he became febrile; previously he had had no fever. After his fourth injection on July 6th, his fever stopped.

On July 11th small papules appeared; he was injected on the 13th with both Sobita gr. 3 and Bayer 205 gm 1. Severe stomatitis was present by the 16th which rapidly improved with Thiostab. Two further injections of Sobita, gr. 2, did not cause stomatitis. The eruption disappeared; but the itching was still intractable. On August 31st the course of Bayer was resumed to a total of 10 weekly injections of gm 1.

No improvement occurred in this case. He is now slowly becoming more choreic, and less mentally stable. His itchiness has abated to some extent, but his general condition is steadily getting worse.

#### CASE NO. 38.

Huseine Wangara. Male, about 15.

26/8/27. Sleeping for months, unable to work. General pains. Born at Kintampo, has also visited Kumasi and Dunkwa. Stupid looking, legs far apart, but speaks intelligently. T. 100, P. 104, cough, twitching.

Pyorrhoea. Hiccough. Knee jerks strong; other reflexes normal. Fresh blood negative; C.S. fluid, 800 cells per c.mm. Bayer 205 gm  $\frac{3}{4}$  injected intravenously. He at once vomited frothy fluid. At 5 p.m. his temperature was 103; filaria was found in fresh blood. On 29th a second injection did not cause vomiting. He returned on 15th September, improved; another injection was given. On 22nd the improvement was marked; he stood normally and no twitching. Bayer was given on 15th and 19th September. He is now apparently in perfect health.

#### CASE NO. 39.

Isufu Dagomba. Male, about 15.

Had sleeping sickness since small boy. Has lived in Kintampo and in the villages near-by. Brother of Case No. 4. Slightly dull looking. Now unable to work well. Headache. Sometimes evening fever. Answers in an intelligent way. T. 100, P. 116, slightly variable in strength, R 30. Typical glands neck, supraclavicular, axillary and groin. Bleeding gums. Reflexes normal. Filariae abundant in fresh blood.

On 20th September, 1927, gm  $\frac{1}{2}$  Bayer 205 was injected intravenously. He vomited frothy fluid after. On 22nd it was repeated; no vomiting, but his hand and face became oedematous, and he complained of being itchy all over, especially on the soles of feet. This passed off quickly. No unusual symptoms followed the third injection on the 24th. Two further injections were given at weekly intervals. He stopped sleeping, but still complained of headache. He now reports that he is in perfect health; but relapse is almost certain.

#### CASE NO. 40.

Peter Mensa. Male, about 30. Carpenter.

Complained of pain in the neck and falling asleep for one month. Very severe headaches before onset of this illness. Lives at Sufikrum, the Christian suburb of Kintampo; has visited Kumasi and Tekiman. Headache came on first at Tekiman 3 months before. Formerly intelligent looking, he now looks dull and depressed. Typical gland on neck.

Bayer 205 gm 1 was injected on September 20th, 22nd and 24th, 1927. Considerable improvement followed. Further weekly injections were given up to a total of 10, but the sleep symptoms did not entirely stop.



## CASE NO. 41.

Lamini Wangara. Male, about 19.

Complains of sleeping sickness and general pains for two months. Severe headache. From Attabubu; he visited only Nkoranza and some villages. Fatuously emotional. Stigmata of Yaws. Hard glands in neck, small, movable. Similar glands in right epitrochlear and both femoral and inguinal regions. Wasted. Spleen 2 fingers down; liver edge palpable but not enlarged.

Three injections of Bayer  $\frac{3}{4}$  gm. Bayer were given at irregular intervals in September, 1927. In December he went away, apparently in perfect health.

## CASE NO. 42.

Mumuni Dagomba. Male, 15.

A typical wasted ataxic case, walking with difficulty, anæmic, and somnolent. Bleeding and pyorrhoea of lower gums.

On 1st October, 1927,  $\frac{3}{4}$  gm. Bayer were injected, and repeated at weekly intervals up to 7 injections. He reported improvement, but it was not very visible. He returned on 18th January, 1928, in much the same state; he was injected further on the 18th and 25th January.

## CASE NO. 43.

Bawa Wangara. Male, 40. Married.

His wife reported his sleeping, foolish talk, and tremor. He was admitted on 18th November, 1927. Trypanosomes were found in fresh blood on 26th, and Bayer 1 gm. was injected intravenously next day. His course had previously been afebrile, but after the Bayer he got a rigor and his temperature rose to 103.8, but fell to normal same day. His second injection on the 28th, was followed by a rise to 100, but the rigor occurred next day, with temperature of 101.

No rigor followed his third injection, nor any fever. Only a slight rise to 99 followed his fourth, a week later; but the fifth was followed by a rigor two days later. After this he became irregularly febrile, and the effect of the injections on his temperature was no longer clearly marked. No improvement followed the treatment, 10 gm. being given in all.

## CASE NO. 44.

Ekua Saa. Female, about 22. Married.

Headache about one year. Sleeping five days, pain in neck, general pain, fever. Mother died of sleeping sickness in May, 1927. Speech abnormal. Amenorrhoea 6 months, but no marked anæmia. Hookworm ova in fæces.

From October 18th, 1927, to November 14th, she attended morning and evening. Her temperature was taken and fresh blood examined each time. She usually had fever in the evening. Fresh blood showed frequent filariæ, but no trypanosomes. Gland puncture was negative; Leishman blood film was negative; Wassermann was negative. No result followed injection of 5 cc blood subcutaneously into a guinea-pig.

During this period she frequently fell asleep while waiting. Thymol treatment was given; no further ova were found, but her symptoms continued. Lumbar puncture gave a cell count of 100 per c.m. on November 16th. The same day she was given Bayer gm. 1 intravenously. She became comatose that evening, but was in her usual condition next day. On 18th and 21st the injection was repeated, and then at weekly intervals to 11 gm. Temporary improvement followed the early injections; she relapsed, and is now in much the same state as when she came first.

## CASE NO. 45.

Ama Nani. Female, about 10.

For about two months severe headache, pains in the neck, and sleeping when ever she sits down, even in daylight. Anæmic. Marked myxoedema; supra clavicular pads; covered all over with non-elastic non-pitting subcutaneous tissue. Born at Jema; came to Sufikrum a year ago.

Hookworm ova. Fresh blood negative; Leishman blood film negative. Evening temperature 100.4. Her blood was examined morning and evening for two days, but then she became comatose, and Bayer 205 gm.  $\frac{1}{2}$  was given. She was also given Thyroid gland tabloids gr.  $1\frac{1}{2}$  daily. Two days later, on 24th November, 1927, the dose of Bayer was repeated, and the Thyroid increased to gr. 3 daily. Bayer was repeated on 26th, and then two more injections at weekly intervals. The thyroid was increased to  $4\frac{1}{2}$  grs daily from the 3rd to 24th December, and then stopped, as a slight tremor appeared. Great improvement followed the treatment, and she is now stated to be normal.

From previous experience, one may be sure that relapse will follow.

#### SUMMARY OF NEW INTRAVENOUS CASES.

No. 17.—Joseph. M., about 40.

24/11/26. Somnolence. Tryps in gland juice.

Bayer. Eight doses of gm. 1 and one of gm. 2 at irregular intervals.

Result. Temporary improvement. Died.

No. 18.—Akinvibri. M., about 26.

30/5/27. Comatose. Tryps in blood.

Bayer. One dose of 0.5, four of 1, one of 1.5, three of 2, one of 2.5, one of gm. 3 at irregular intervals.

Result. Temporary improvement. Died.

No. 19.—Sediki. M., about 25.

21/7/26. Tryps in blood.

Bayer. One of 5, two of 1, one of 1.5, one of 2.5 one of 3 gm. at intervals of 2 to 3 days. Three of gm. 1 at weekly intervals.

Result. Apparently cured.

No. 20.—Asana. F., about 35.

21/7/26. Coma.

Bayer.  $\frac{1}{2}$  gm. 1 gm. 2 gm. on alternate days.

Result. Temporary improvement. Died.

No. 21.—David. M., about 12.

31/8/26. Somnolent.

Bayer. Three of gm.  $\frac{1}{2}$  on alternate days, then seven of gm.  $\frac{1}{2}$  at weekly intervals.

Result. Temporary improvement. Died.

No. 22.—Kwesi. M., about 22.

1/9/26. Mental instability.

Bayer. One of gm. 1.

Result. Temporary improvement. Died.

No. 23.—Effua. F., about 40.

15/10/26. Mental instability. Tryps in C.S.F.

Bayer. Three of gm. on alternate days; one of gm. 1 after a week.

Result. Temporary improvement. Died.

No. 24.—Mamudu. M., about 40.

30/9/26. Tryps in blood.

Bayer. Three of 1 gm. alternate days, two of gm. 1 at weekly intervals.

Result. Apparently cured.

No. 25.—Amigahara. M., about 24.

1/3/27. Headache. C.S.F. pleocytosis.

Bayer. Three of 1 gm. alternate days, then two at weekly intervals.

Result. Temporary improvement. Relapse.

No. 26.—Yeriya. M., about 30.

5/4/27. Somnolent.

Bayer. Three of 1 gm. on alternate days, then two at weekly intervals.

Result. Improved.

No. 27.—Jawiri. F., about 30.

21/3/27. Somnolent.

Bayer. Three of 1 gm. in one week.

Result. Improved.



- No. 28.—Ama. F., about 30.  
 5/4/27. Headache, somnolent.  
 Bayer. Two of 1 gm. alternate days; four at weekly intervals.  
 Result. Improved.
- No. 29.—Musa. M., about 45.  
 6/4/27. Somnolent, ataxic, tremulous.  
 Bayer. Two of 1 gm. in three days.  
 Result. Died.
- No. 30.—Mechemeny. M., about 19.  
 4/6/27. Somnolent, asthenic, emaciated.  
 Bayer. Three of 1 gm. alternate days; one of 1 gm. a week after.  
 Result. Temporary improvement. Died.
- No. 31.—Akosua. F., about 35.  
 21/6/27. Stuporous, tremulous.  
 Bayer. One of 1 gm.  
 Result. Died.
- No. 32.—Ageteboya. M., about 30.  
 27/6/27. Ataxic, mental instability.  
 Bayer. Three of 1 gm. alternate days; seven of 1 gm. weekly intervals.  
 Result. Not improved.
- No. 38.—Huseine. M., about 15.  
 28/8/27. Somnolent, chorea.  
 Bayer. Five of gm.  $\frac{3}{4}$  at irregular intervals.  
 Result. Apparently cured.
- No. 39.—Isufu. M., about 15.  
 20/9/27. Somnolent, headache, ataxic.  
 Bayer. Three of  $\frac{1}{2}$  gm., alternate days; two of  $\frac{1}{2}$  gm. weekly.  
 Result. Apparently cured.
- No. 40.—Peter. M., about 30.  
 20/9/27. Somnolence, headache.  
 Bayer. Three of 1 gm., alternate days, seven of 1 gm., at weekly intervals.  
 Result. Improved.
- No. 41.—Lamini. M., about 19.  
 29/9/27. Somnolence, headache.  
 Bayer. Three of  $\frac{3}{4}$  gm. at irregular intervals.  
 Result. Apparently cured.
- No. 42.—Mumuni. M., about 15.  
 1/9/27. Ataxic, emaciated, asthenic, somnolent.  
 Bayer. Seven injections of  $\frac{3}{4}$  gm. weekly; two of  $\frac{3}{4}$  gm. weekly, two months after.  
 Result. Improved.
- No. 43.—Bawa. M., about 40.  
 18/11/27. Mental instability, tremor, somnolent, tryps in blood.  
 Bayer. Three of 1 gm. weekly.  
 Result. Not improved.
- No. 44.—Ekua. F., about 22.  
 18/10/27. Somnolence.  
 Bayer. Three of 1 gm. on alternate days; 8 of 1 gm. weekly.  
 Result. Temporary improvement. Relapse.
- No. 45.—Ama. F., about 10.  
 22/11/27. Comatose.  
 Bayer. Three of  $\frac{1}{2}$  gm. alternate days; two of  $\frac{1}{2}$  gm. weekly.  
 Result. Apparently cured.  
 Summary of results: Intravenous cases.

Six cases were apparently cured. Of these all but one (No. 24) have been observed only over a short period, and will probably relapse. No. 24 was an early case and one may indulge a reasonable hope of cure.

Seven cases were improved. They are sure to relapse and die.



Two cases were not improved. One of these was a mildly maniacal case. While somnolent or comatose cases are usually dramatically improved, hysterical or mental cases are never improved by Bayer 205.

Nine cases died. Of these, seven had temporary improvement; and got only two injections (No. 29); and one (No. 31) was moribund when seen.

Apparently cured	..	..	..	..	6=25%
Improved	..	..	..	..	7=29.17%
Not improved	..	..	..	..	2=8.33%
Died	..	..	..	..	9=37.50%
Total .. .. .					24

### THREE CASES TREATED INTRATHECALLY.

Since it is now generally recognized that "Bayer 205" given intravenously fails to influence the progress of trypanosomiasis of the central nervous system, intrathecal medication would seem to be indicated. The earlier attempts at intrathecal injection resulted in the immediate death of the patient or in the production of serious symptoms. In 1926, Edwards (whose paper summarizes the previous literature), pointed out certain fallacies which seem to have been overlooked by previous investigators, viz :—

1. Since the drug is apparently unable to pass through the choroidal plexus, the entire quantity injected must act on the cerebrospinal system alone. The dosage should, therefore, be calculated on the weight of the cerebro-spinal tissues, not on that of the entire body.

2. As the circulation in the cerebro-spinal fluid is slow, the dilution should be greater for intrathecal than for intravenous work.

Edwards used on horses a solution of 0.1 per cent strength, which he found to be tolerated. The case was regulated by the weight-ratio between the cerebro-spinal and body tissues which for the horse was taken as 1:500. His results indicated that combined intravenous treatment "is capable of yielding more durable results" than intravenous treatment alone. This seemed to justify intrathecal medication by his methods on human cases which were otherwise hopeless. The ratio of cerebro-spinal tissue to the body, in man, was taken as 1:50; and the strength of solution was the same as that used for horses. 20 cc. of cerebro-spinal fluid were withdrawn, and 20 cc. of 0.1 per cent solution of Bayer 205 were injected.

### CLINICAL NOTES ON THE CASES.

*Case No. 33.*—Amadu Moshi, Male, about 35.

This was an advanced case of sleeping sickness. Was able to walk with stick, with a very unsteady gait. Had both gross tremor and fibrillary twitching. Lethargic; sat all day looking to his front; answered a question after about 10 seconds delay, but in a fairly reasonable way. One large almond shaped gland left side of neck. Smaller glands right side of neck and left femoral region. Tongue slightly coated, gross tremor, abdomen held rigid. Right knee jerk brisker than left. Pupils react to light. Blood negative. Three injections of Bayer 205, gm. 1, were given intravenously on alternate days, followed by two at weekly intervals. This had no effect on his condition. On 19/11/26, 20 cc. of C.S.F. were withdrawn and 20 cc. of 0.1 per cent Bayer 205 were injected. Immediately, he complained of pain in the right knee. Five minutes after the injection, his tremor became very marked. The pain in knee continued for four days. No marked change followed; he continued to grow steadily weaker, as he had been doing since admission. From November 20th until December 11th, four more intravenous injections were given without benefit; after this he was given three injections of Antimony Tartrate, of gr.  $\frac{1}{2}$ , but his weakness became so pronounced that it was discontinued. On January 16th, he died.

*Case No. 34.*—Wiakan Grunshi. Male, about 35.

Was brought in on 15th October, 1926, unable to speak. For one year he had had severe headache and somnolence. The day before he had gone to his farm fairly normal and returned in the evening with fever and speechless.

Unable to walk without help. Sleeps as soon as he sits down. Arms and legs dry and scaly. Typical glands both sides of neck. Two very big femoral glands, one on each side, also some glands enlarged to a lesser degree.

Kerandelism. Knee jerks brisk; ankle clonus left; Babinski right; no plantar reflex left; œdema of feet; blood negative. Intravenous Bayer 205 was given on the 1st, 3rd, and 5th days, 1 gm. A further gm. 1 was given on November 2nd. There was no improvement except partial restoration of speech. On 9th November, intrathecal injection was done as detailed above. At once he felt pains all over, and had pronounced tremor. Fifteen minutes later, he had severe pain in both knees. This gradually abated. On the next day his headache was more severe than usual.

On the 13th, he had an intravenous injection of Bayer 205, gm. 1. On the 15th, he began walking about in an aimless way; he was stronger physically, but worse mentally. On the 17th, he had an attack of mild dysentery. Further injections of Bayer 205 intravenously were given on the 20th and 26th. He died on December 12th.

*Case No. 35.*—Amadu Dagarti. Male, about 30.

From June, 1925, his health had been failing with no definite symptoms. In October, 1925, trypanosomiasis was suspected, but blood and gland juice were negative. He was employed as headman of sanitary labourers; and the Inspector now noted that he was becoming sleepy and forgetful. As hookworm ova were found in his fæces, and repeated blood examination were negative, he was treated with thymol, with some temporary improvement. Afterwards his work degenerated so much that he was discharged as headman and put in charge of an incinerator but did not do even this work well. On 1st September, 1926, he was obviously suffering from sleeping sickness and was admitted.

He was given intravenous injections of Bayer 205 gm. 1 on 1st, 3rd, and 5th days and then at weekly intervals. After the fourth injection, he said that his sight and hearing were improved and he was sleeping better; but objectively he seemed little improved. On November 13th, intrathecal injection was done, but the immediate pain was so severe that the full amount of 20 cc. was not injected. Only 10 cc. were injected, though 20 cc. of fluid had been withdrawn first. There was marked tremor as soon as the injection was done. Next day he had severe headache and pain at the site of puncture. On November 15th, his headache continued, and he had pain in the neck. On the 17th he had pain only when walking, none when sitting. On the 19th he had headache only on coughing. By the 21st his pain had stopped.

Three more injections of Bayer 205, gm. 1, intravenous, were given at weekly intervals, completing the intravenous dosage to gm. 10. Marked improvement took place, and on December 9th, he was discharged apparently normal, but on trial was found unable to work efficiently. On 21st January, 1927, he had a complete relapse, with gross tremor and slurring speech. Since then, he has had times of apparent improvement alternating with further relapses, but the general trend has been for the worse. A further attempt at treatment is detailed in next section of this report.

*Case No. 36.*—Puliga Bedende. Female, about 20.

An advanced case, undersized and underdeveloped mentally and sexually. Has had recurrent attacks of fever with pain in legs. For 10 days, prior to admission, her pains had been so severe that she was unable to walk.

Gait slow and clumsy, looking down. Dull, rather puzzled expression, eyes very big. Speech slow and slurring; tinea on face. Typical gland right side of neck. Discharged of pus and a little blood from gums. Knee jerks brisk. Blood showed B.T. parasites.

She was given three injections of Bayer 205 gm  $\frac{3}{4}$  at 2 day intervals followed by two of gm 1 at weekly intervals. During the course an intractable diarrhoea with copious mucous stools began. I was informed that she had had previous similar attacks. She gradually became thinner and weaker. On November 20th she was given .015 gm Bayer intrathecally. The pain and tremor following were not more marked than in the other cases; but she continued to fail. On December 12th she died.



Case No. 37.—Sackay Grunshi. Male, about 32.

A soldier of the Gold Coast Regiment, a steady, reliable private who never distinguished himself either by exceptional brilliancy or by appearing in the orderly room. He was admitted on 3/10/26 with a sudden attack of fever with headache. He was treated with quinine. He had no previous history of illness. Two days after admission a swelling appeared on the side of his head, inflamed, and seeming to be of bony consistency. On the even of the 7th his temperature rose to  $101^{\circ}$  and trypanosomes were found in fresh blood.

He was put on Bayer 205, gm 1 on alternate days for three injections, then at weekly intervals. During the course he was treated for hookworm with thymol. He became dull, and used to talk to himself. On November 22nd he stated that a certain tree, which he could identify had come and talked to him. Being informed that this is not a common belief among pious Grunshis, I concluded that he was mentally affected, and that therefore the disease had attacked his cerebro-spinal system. The Cerebro-spinal fluid removed contained only 4 cells to the cubic millimetre, so perhaps my conclusion was wrong. Intrathecal injection was carried out as above at 12 noon on November 26th. Immediately he complained of pain all over and sweated. Soon a marked tremor was seen; sweating continued. He walked back to his ward. He slept in a restless way, constantly moving and occasionally waking and complaining of smelling a bad smell. At 5.40 p.m. he vomited and complained of headache. His pulse was then weak. He became delirious. At 8 p.m. his pulse was 80, strong, but irregular. He was tossing about as if in severe pain, not articulate, but by his gestures headache seemed to be very severe. He was given Atropine gr. 1/100 and Morphia gr.  $\frac{1}{4}$ . Occasionally vomiting continued until 10 p.m. He had frequent convulsive seizures, with head and neck raised from the pillow, and arms and legs straight and rigid. At 2 a.m. he was quite, lying as if unconscious, but showed sign of hearing if spoken to in a low tone. Pulse was fast and regular. This continued until 9.45 a.m. I then decided that it would be advisable to remove or dilute the drug in the spinal fluid. 15 cc. were removed by lumbar puncture, and 10 cc. of normal saline injected.

The fluid was not under pressure, but contained about 3,000 cells per c. mm. He was given Morphia gr.  $\frac{1}{4}$  and Atropin gr. 1/100 and an enema; he then slept.

The next night he slept normally, but he complained of headache for about 10 days. On December 1st he was sleepless, but this passed off next night. On December 4th he had conjunctivitis of one eye without external cause, this disappeared in two days. On December 9th he was discharged to light duty, very weak, but otherwise normal. He gradually improved until he became quite normal, and remained so for about 6 months.

On July 21st he had a sudden attack of severe unilateral headache. It was treated with a purge and aspirin, and next day he was discharged fit.

#### SUMMARY.

1. Five cases of Trypanosomiasis have been treated with small doses of very dilute Bayer 205 intrathecally.
2. Alarming symptoms may follow even these small doses.
3. Advanced cases are not benefitted.
4. One acute case, with definite cerebral symptoms but only 4 cells per c. mm. of C.S.F., appears to have been cured.

#### 4. INJECTION OF TRYPANOSOMES SUSPENDED IN BAYER 205

Kligler and Weitzman (1926) found that resistance to trypanosome infection can be produced by injecting trypanosomes suspended in Bayer 205. It was therefore determined to try this method in human cases. Efforts to establish an infection in guinea-pigs by injection of blood failed, even when trypanosomes were abundant in the blood used. Human whole blood containing trypanosomes was therefore used.

On 26/11/27, 5 cc. of blood, containing abundant trypanosomes was withdrawn from Case No. 43, mixed with 1 gm. Bayer dissolved in 5 cc. normal saline and injected intramuscularly into Case No. 35. The immediate improvement was very marked; his tremor which has been very gross, became almost imperceptible; his somnolence decreased greatly; his fever stopped. All the symptoms gradually relapsed; and his conditions is now as bad as before. No further supply of trypanosomes have been obtained to continue this line of treatment; so this solitary attempt remains quite inconclusive.



## GENERAL SUMMARY.

1. Intravenous Bayer 205 has failed to cure cases of trapanosomiasis with definite central nervous symptoms. It has cured an early febrile case.
2. Intrethecal Bayer 205, even in minute dilute doses may produce alarming symptoms. It has apparently cured an early cerebral case.
3. An inconclusive attempt has been made at treatment with trypanosomes suspended in Bayer 205.

## REFERENCES.

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Kligler (L.J.) and Weitzman (I) 1926 "Susceptibility and Resistance of *Trypanosoma* Infections. I. Attempts at Immunization with dead and Attenuated Trypanosomes" Rev. in T.D.B. Vol. 24 No. 7 p. 573.

## APPENDIX C.

## MISCELLANEOUS CASE REPORTS OF INTEREST AND EXTRACTS FROM ANNUAL REPORTS OF MEDICAL OFFICERS.

The following case of Yellow Fever is given in full on account of its great historic and scientific interest. It is fortunate that it has been so carefully recorded.

It is the second European case referred to in the American Journal of Tropical Medicine Volume VIII No. 2, March, 1928, conclusion No. 7, page 162, the first being that of the late Dr. Adrian Stokes. It is mentioned there that from one patient (this was Dr. Stokes) the disease was transmitted to monkeys by means of mosquitoes. The blood taken from the case of "P" recorded here infected with Yellow Fever the macacus monkey inoculated by Drs. Mahaffy and Thomson and the strain, now known as the "P—" strain, has been kept going in monkeys both by direct inoculation of blood and by means of mosquitoes in the Lagos Laboratory of the Rockefeller Yellow Fever Commission. It is to be noted that Noguchi's icteroides vaccine which this case had received some four months before the onset of the disease failed to protect.

## REPORT ON MR. H—P—. BY DR. D. DUFF, SENIOR MEDICAL OFFICER.

European (German) aged 27.

Fell ill on the 18th September, 1927, at Accra.

Died on the 23rd September, 1927, at Accra.

Diagnosis—Yellow fever.

*Previous History.*—Mr. P.—was an assistant of the Hamburg Trading Co., Accra. He had lived in Accra for just a year. This was his first tour in Africa. He had not slept outside of the Accra premises of the Hamburg Trading Company during the three weeks preceding the onset of his illness. He stated, he used his mosquito net carefully and took quinine three grains daily and an extra three grains every Wednesday and Sunday. The premises of the Hamburg Trading Company are in Horse Road within a short distance (about 20 yards) of the premises of J. F. Sick and Company, where two cases of yellow fever in European women had occurred in May of this year.

Mr. P.—had been inoculated with Noguchi's Anti-Yellow Fever Vaccine at the end of May or beginning of June of this year by Dr. C. V. Le Fanu, Medical Specialist. The first injection was given at one side only in the upper arm, and caused a severe reaction, the second similarly in the other arm about eight days later.

## PRESENT ILLNESS.

18th September, he had lunched at about 2 pm. in apparent good health, the lunch consisting of "palm oil chop." Felt ill between 4 and 5.30 p.m. Had a shivering fit and a feeling of great tiredness. Headache came on. He wondered what was wrong. Had he taken too much alcohol at lunch? No. He had only had one glass of wine. Had the lunch upset him? He could not tell. Was seen by Mr. J. R. Peuker (assistant of the Hamburg Trading Co.) sitting in his room leaning forward in a chair with his forehead held in his hand. He complained of feeling "done in." Went to bed at 8 p.m.

Temperature was 39.3 C [F—102°.7]. No quinine taken. A dose of aspirin was taken for his headache and to cause a sweat. A slight sweat resulted. Pyjamas and sheets were changed at 10 p.m. They were not wet, but just slightly damp. The skin tended to be dry. Headache was continuing. Bowels had not opened all day.

19th September, 8 a.m. seen by Mr. Peuker. Had passed a restless night. Temperature 39.1 C [F—102°.4]. Dr. A. C. Paterson, Acting Senior Medical Officer in charge of the European Hospital, Accra, sent for. The following is the report of Dr. Paterson:—

"Mr. P.—, Hamburg Trading Co.

I was called to see Mr. P.— on the 19/9/27. I saw him at 11 a.m. when he complained of fever, aches in the legs and back and slight headache. No abdominal pain—no enlargement of liver or spleen and no tenderness, no icterus, no vomiting. Temperature was 101° and pulse 120. He said, he had a rigor that morning. Blood taken and quinine prescribed in the meantime as the case suggested a typical malaria. I was unable to visit patient next morning but went about 5 p.m., when there was an entirely different picture. He looked very ill and said he felt ill. He had an anxious expression, eyes were suffused and rather bright. Headache was fairly severe and temperature had mounted to 105 and pulse was fast. He had been vomiting yellowish fluid and was unable to retain his quinine. I took him straight into hospital. Took more blood films, gave an intramuscular quinine (grs. IX) and later on he was given morphine gr. 1/6 as he was very restless and had not slept much the previous night.

Next morning I was unable to go on duty and Dr. Duff took over the case.

A. C. PATERSON,  
*Medical Officer."*

Bowels had not opened on the 19th. The evening temperature on that date was, according to Mr. Peuker, 38.6 C. to 39 C [F—101.5 to 102.2]. During the course of the 20th according to Mr. Peuker the temperature had been as follows:—

4.50 a.m.	C 38.6°	— (F 101.6°)
7.30 a.m.	C 37.4°	— (F 99.3°)
11.30 a.m.	C 39°	— (F 102.3)
2.0 p.m.	C 40°	— (F 104°.)
4.0 p.m.	C 40.3°	— (F 104.5°)

Bowels had opened once. A watery motion. Not large. Case was admitted into Hospital at 6 p.m. on the 20th, after having been seen by Dr. Paterson.

21st September, I was rung up about 9 a.m. by Dr. Paterson, who stated that he was ill and he asked me take over duty for him. I visited the hospital about 9.50 a.m. The sister on duty gave a history that Mr. P.—had vomited about 11.45 p.m. the previous night. This vomit had been lost in the pan. He had vomited again about 2.50 a.m. of this morning. This specimen had been preserved. The vomit consisted of about two ounces of a darkly reddish watery fluid with a definitely blackish fine deposit. He had been drinking water and had vomited what was, to my eye, water, which was blood stained, with altered blood. 6 a.m. temperature F. 100.6 degree, pulse 90 good. At 8 a.m. he had passed urine 7½ ounces. On



boiling  $\frac{2}{3}$  of a test tube full and acidifying with one per cent acetic acid, a deposit of from 25-30 per cent albumen appeared. I at once thought of yellow fever and then visited the patient. He had slept till 11 p.m. after the morphine injection but had remained wakeful and restless during the rest of the night. He complained of lack of sleep and a general feeling of prostration. No photophobia. No headache at the moment. No epigastric pain. No epigastric tenderness. A fairly steady feeling of nausea complained of. No enlargement of spleen or liver. Physical signs of heart and lungs normal. No cough at any time.

*Skin.*—Naturally of a sallow tint, but I thought there was a slight greenish icteric tinge on the temples and flanks. This was difficult to be sure of.

*Eyes.*—Were not icteric; but were somewhat suffused and brightish. The lids were puffed and bluish.

*Lips.*—No herpes.

*Gums.*—No obvious swelling. No bleeding.

*Tongue.*—Normal in size. White coat on dorsum. Red at edges and tip.

*Epistaxis.*—Nil.

Yellow fever was at once strongly suspected and Dr. P. S. Selwyn-Clarke, who was then acting for the Deputy Director of Sanitary Service at Headquarters, notified by telephone. Dr. A. F. Mahaffy of the Rockefeller Yellow Fever Commission also notified by telephone. Both arrived very shortly afterwards and concurred in the diagnosis. The diagnosis of yellow fever was settled to my mind later in the day when I saw Dr. W. Thompson, Assistant Pathologist of the Medical Research Institute and read his reports on the blood-films which Dr. Paterson had taken. These reports, taken with the history, present condition, diminished urination and albuminuria, recent relative slowing of the pulse, character of the vomit and the fact that he had been living in a house within 20 yards of which two recognised cases of yellow fever had occurred about four months previously left no doubt whatever in my mind as to the nature of the case.

11.30 a.m. Vomited a small quantity (about ozs ii) of water with blood-stained specks; shreds of mucus and coffee-grounds.

12 a.m. Dr. W. Thompson and Dr. Mahaffy collected a specimen of blood for injection into monkeys, for slides, culture, etc.

Also took away for examination some of the urine which had been passed at 8 a.m. Dr. Thompson reports on these specimens as follows:—

“ ANIMAL INOCULATION AND CULTURE OF BLOOD OF H—P—.

At 12 midday 21st September, 1927, 20 cc. of blood were drawn from the median basilic vein, and distributed as follows:—

- (a) 5 cc. into 100 cc. Douglass broth PH. 7.6.
- (b) 5 cc. into 1 cc. of 1.5 per cent sodium citrate in normal saline.
- (c) 6 cc. into 12 cc. of 1.5 per cent sodium citrate in normal saline.
- (d) 4 cc. were immediately injected intraperitoneally into a small healthy (visibly) macacus monkey which had been brought for the purpose to the hospital clinical room ten yards from the patient's bed side. On arrival at Medical Research Institute 5 cc. of specimen (b) were injected intraperitoneally into a large macacus at 12.46 p.m. the same day.

This macacus had an occasional hookworm in his fæces of a type still to be identified—otherwise he was healthy and the best of the four monkeys in stock. These inoculations were carried out on behalf of the Rockefeller Yellow Fever Commission and the temperatures of the injected animals were taken daily for Dr. Mahaffy—the local member of the Commission. Coincident with a definite increase in temperature of the small macacus was the arrival of Dr. A. M. Walcott of the Rockefeller Commission from Lagos on the morning of Saturday 24th September—he took over complete control of the animals for further investigation.

Specimens (a) and (c) are still being investigated by different cultured methods at the Medical Research Institute, so far with negative result.

(Sgd.) W. THOMPSON,  
Assistant Pathologist.”

## TREATMENT.

The following was instituted after I had seen the patient. S. and W. Enema stat. This acted early but with poor result. 5 per cent Glucose in normal saline to be started p.r. after bowels were opened. Ozs. vi every 3 hours. Soda Bicarb gr. x in oj water by mouth every 5 hours. Iced barley water (with Glucose oz i to each Oj and Iced milk and *ad. lib.* by mouth or ozs i to ii every 20 minutes as he could retain. No quinine administered.

Hot water bottles to loins and over bladder.

At 6 p.m. Temperature 101.6° Pulse 88 full.

Bowels had opened three times. Medium quantity and watery, greyish-yellow in colour. During the day his intellect was quite clear. He complained of nothing when asked, but appeared listless and apathetic. He was naturally, I think, of a slow stolid type. The salines p.r. were well retained. One only was returned.

9 p.m. Omnopon gr. 1/5 Hypo. was given to secure rest for the night.

9.50 p.m. He vomited about ozs iii of watery fluid with fly specks and tiny reddish flakes.

22nd September. Temperature 100.4° Pulse 88 softer.

6 a.m. Had passed another restless night. The rectal saline had been all retained. The general condition was similar to the previous day but he seemed more apathetic and prostrated. No urine had been passed since 8 a.m. on the previous day. The skin was now yellowish. The scleræ were icteric but not markedly so.

8.50 a.m. Black vomit ozs vi.

10.0 a.m. Black vomit ozs iv.

11.0 a.m. Intravenous saline with glucose 5 per cent ozs xl. Asked for food.

12.0 a.m. Rigor which lasted for 5-10 minutes and then passed off.

Probably due to the intravenous glucose saline.

During this day his intellect remained clear, but the general condition was becoming worse. The anuria pointed to a fatal issue. In the afternoon he spoke quite clearly to his friends and stated he felt perfectly well.

He had been retaining the salines and the fluid given by the mouth. He had passed four small "pea soupy" stools during the day and in estimating the amount of fluid retained, allowance must be made for fluid of the stools and vomit.

No urine had been passed. I considered that there was now very little hope.

6. p.m. Temperature 100.4° pulse 108 soft.

9 p.m. Omnopon gr. 1/3 Hypo.

23rd September. During the night he had become restless with noisy delirium. At times almost violent; at times he had quiet intervals. Very thirsty. Drank large quantity of fluid. Convulsive twitchings of muscles.

The following is a brief summary of final events.

12 a.m. Temperature 100.6° pulse 108 weak.

1 a.m. Morphine gr. 1/4.

2 a.m. Black vomit ozs viii.

3 a.m. Temperature 101.4° pulse 110.

6 a.m. Temperature 102° pulse 110.

From now on he was semi-comatose.

11 a.m. Blood slides taken by Dr. W. Thompson.

12 noon. Death. Skin dusky yellow.

At 2 p.m. An autopsy was performed by Dr. A. S. Burgess, Acting Director of Medical Research Institute, Dr. W. Thompson taking the notes. Dr. Mahaffy was present throughout. I was present part of the time.

Attached (1). Temperature chart of the illness.

(2). Summary of the Laboratory reports of Dr. W. Thompson, Assistant Pathologist at the Medical Research Institute, on the blood films taken and the urine passed in hospital, and the black vomit.

(3). Report of the autopsy by Dr. A. S. Burgess, Acting Director of Medical Research Institute.



COMMENT.

There is little to say on the clinical aspect of this case. It was a fulminant case of Yellow Fever with profound toxæmia, and was of the same type as the two fatal cases which had occurred in the previous May. Sudden onset, albuminuria with suppression of urine, black vomit, delirium, coma and death. The feeling of helplessness in dealing with a case of this sort, is very depressing. On the scientific side however, this may be a very important case in view of the animal experiments now being made by the Investigators of the Rockefeller Yellow Fever Commission.

D. DUFF,

*Acting Deputy Director,  
Medical and Sanitary Services.*

(Temporarily in charge of the European Hospital).

28th September, 1927.

P.S.—I have to thank the Acting Director of Medical Research Institute, Dr. A. S. Burgess and Dr. W. Thompson, Assistant Pathologist for their interest and assistance given to me in this case.

D. DUFF.

PATHOLOGICAL EXAMINATION OF MATERIAL FROM CASE OF H— P—

1. BLOOD FILMS.

(a) *Differential Leucocyte count :—*

			19th Sept.	20th Sept.	21st Sept.	22nd Sept.	23rd Sept.				
				Edge	Centre			Edge	Centre		
Lymphs	..		19	6	13	4	5	7	14	7	9
Large Monos	..		4	2	1	2	1	0	1	2	1
..	..	..	76	92	86	94	93	85	85	91	90
..	..	..	1	0	0	0	0	0	0	0	0

All Transitionals included with Lymphocytes.

(b) *Total leucocyte count :—*

12 mid-day 21st September—6,800 per c.mm.

11 a.m. 23rd September (1 hour before death) 17,000 per c.mm.

(c) *Total Red cell count :—*

11 a.m. 23rd September 6,400,000 per c.mm.

(d)...*No parasites, no abnormal cells found except :—*

(1) in one film of 20 or 21st September—2 nucleated P.B.C.

(2) in one film of 20 or 22nd September—1 nucleated P.B.C.

2. (1) URINE OF 20/9/27 :—

Acid. No casts. diacetic acid. No bile.

Marked presence of albumen.—Amorphous Urates.

(2) URINE FROM BLADDER at P.M. 23/9/27.—See P.M. report.

3. BLACK VOMIT :—

Presence of blood—positive strongly by Benzidine Reaction.

W. THOMSON,

*Assistant Pathologist.*

27th September, 1927.

24TH SEPTEMBER, 1927.

Post-mortem on H— P— (German Nationality—age 27<sup>1</sup> died 12 noon 23/9/27), at 2 p.m.

*External appearance* :—Rigor mortis well marked in arms and legs. P.M. lividity well marked in dependent parts. Skin pale lemon yellow.

Conjunctivae and sclerae slightly icteric. Gums pale—no bleeding.

*Internal appearance* :—No appreciable jaundice of subcutaneous tissues and costal cartilages.

*Heart* :—Normal in size colour and consistency. Few tiny petechiae on posterior surface and numerous minute petechiae on the root of great veins. The right auriculo-ventricular valve admits tips of four fingers.

The left auriculo-ventricular valve admit two fingers. Interior of valves icteric otherwise normal. One small petechia on inside of left ventricle. Thoracic aorta normal.

*Lungs* :—Both lungs rather congested. Few large petechiae 4 or 5 millimetres in diameter on anterior surface of upper right lobe.

*Trachae* :—Numerous small petechiae on inner surface of fibrous portion and a few on inner surface of cartilaginous portion.

*Alimentary canal* :—Oesophagus normal. Stomach contained 4 or 5 ozs of black-fluid, coffee-ground material. Mucous membrane shows very slight redness. Small and large intestines normal to external view.

*Liver* :—Colour—yellow khaki with fine purple mottling. Size—no enlargement. Consistency—extremely soft and friable. The cut surface is yellow khaki without any element of red colour to the naked eye. Gall bladder normal—contains some dark bile.

*Spleen* :—Normal in size, colour, and consistency.

*Kidneys* :—Right slightly enlarged cortex rather wide—marked distinction between cortex and medulla, the latter showing engorged vessels. Capsule smooth and strips normally. Left Kidney similar, but slightly smaller.

*Bladder* :—Contains about 250 cc. urine; mucous membrane normal. Urine contains no bile—no casts—on boiling and acidifying albumen is present to the extent of 1/5 the original volume of the sample. By Esbach's Albuminometer 0.7 grams of albumen present per 1000 cc.—No acetone—no diacetic acid.

*Diagnosis* :—Yellow Fever.

A. S. BURGESS,

*Acting Director.*

MEDICAL RESEARCH INSTITUTE.

#### A CASE OF LYMPHTIC LEUKAEMIA REPORTED BY DR. A. M. MACRAE, MEDICAL OFFICER, SEKONDI.

This case of Lymphatic Leukaemia is reported in brief. Apart from the rarity of the disease, it is interesting because, as the reporter has pointed out, while clinically the patient appeared to be improving yet there was a steady retrogression in the pathological condition.

Mr. F. W. D. Age 32. Male. Coloured.

*Family History*.—good: born at Cape Coast.

Father and Mother dead. Cause unknown. Both over fifty.

One sister alive and well. Two younger brothers alive and well.

*Previous illness*.—Chickenpox at age 25 years. Fever occasionally.

*Previous Residence*.—Cape Coast, Calabar, Accra, Sekondi.



*Previous History relating to illness.*—Growth at eighteen years rapid ; used to feel easily tired and listless at that period.

*Present illness.*—*First seen* 18/1/28, when he was put on the sick list. Complained of pain over left side especially marked on breathing : of “ tiredness ” and of cough.

*Examination.*—Temp : 101. Pulse 82. Facial appearance not good ; greenish pallor present under natural yellow coloration of skin. His physical appearance was good ; a well built man alert and intelligent. Teeth good, throat healthy, eyesight good.

*Chest.*—(1) Heart. Sounds closed, except in pulmonary area where haemic murmur audible.

(2) Dullness and coarse crepitations with diminished breath sounds over lower part of left lung with few fine crepitations over the right base.

*Abdomen.*—Spleen enlarged downwards to margin of iliac crest ; tender to touch. Liver slightly enlarged below costal margin.

Glands generally not enlarged.

#### BLOOD EXAMINATION.

(1) No malaria parasites, pigmented whites, etc.

(2) Haemoglobin under 61 per cent.

(3) R. B. C. Count, 3,900,000.

(4) Leucocyte Count, 256,000.

(5) Differential Count, Polpymophs, 1.2 per cent.

Lymphocytes 97.9 per cent.

Large Mononuclears, .9 per cent.

Eosinophiles, nil.

The Lymphocytes were of medium size and no nucleated reds were seen.

#### URINE EXAMINATION.

(1) Reaction, acid.

(2) No albumen.

(3) No sugar.

The deposit showed very scanty large leucocytes and red blood cells (the latter only 5 microns in diameter) *Sputum*—negative. *Faeces*—negative.

*Diagnosis.*—Pleurisy and Lymphatic leukaemia. When bed was available on 23/1/28, he was put in hospital. Spleen having decreased to half way between the umbilicus and costal margin, and his pleuritic symptoms having disappeared, he was discharged from hospital for psychological reasons on 2/2/28, being seen daily until 13/2/28, when he pronounced himself feeling fit to resume duty.

This was allowed conditionally on his reporting once a week to the hospital. Clinically he has improved greatly, but pathologically his condition is slowly progressing in the wrong direction as can be seen by the later blood counts.

27/1/28.

R. B. C.	...	...	3,568,000
Leucocytes,	...	...	182,000
Hb.	...	...	95 per cent

21/3/28.

R. B. C.	...	...	2,500,000
Lymphocytes,	...	...	98 per cent
Leucocytes,	...	...	400,000

The two counts above, one in January and one in March, show the steady blood deterioration which has occurred although at the same time, his spleen has improved in size and with the exception of occasionally feeling listless the patient appears to be quite all right and feels all right.



ORIGINAL TEMPORARY LEPER SETTLEMENT, HO.



First Hut of Ho original Leper Settlement, September, 1926.



Lean-to Huts built under the eaves of original Settlement, 1927.



Some of the Huts erected by Lepers themselves outside the original Settlement. Many others exist, 1927.









PERMANENT LEPER ASYLUM, HO.



Part of Permanent Leper Asylum—completed in 1927—to be occupied about June, 1928.



Compounds of the Permanent Leper Asylum.



Well at Leper Asylum—under construction, 1927.



From Sekondi African Hospital the following interesting cases were reported :—

A case of dysentery due to *Balantidium Coli*. This cleared up rapidly on the administration of Stovarsol.

Malignant tumours.—Five.

One fungating sarcoma of groin in an adult.

One fungating sarcoma of left cheek in a child.

One sarcoma of head of humerus and scapula in an adult.

One sarcoma of the orbit in an adult.

Sections from the removed growth in three cases of the four showed them to be of small round-celled type, the fifth tumour was a fungating mass on the left side of the cheek and turned out to be a cystic adeno-carcinoma. The result from operation in this case appeared to be much more hopeful than in the round-celled sarcoma cases. Unfortunately once these cases left hospital, their post-operative history was lost. Dr. Purcell, Medical Officer, Yendi, writes :—

“ I have seen a rather interesting condition, three in Kumasi and one here (Yendi). In each case the patient was a young male, under 15. The symptoms were a general anasarca of rapid onset with slight or moderate fever. The œdema is well marked. Skin of face tense and shiny.....no cardiac disturbance, no albuminuria or only a trace.

“ Subjective phenomena very slight. Authority is of opinion that all cases Beri-beri have cardiac arrhythmia; if so, these cases are not Beri-beri. The condition clears up in two to three weeks.....It conforms most closely to what is described as War Oedema.”

#### APPENDIX D.

##### BRIEF REPORT ON THE LEPER SETTLEMENT, HO.

This report should be read in conjunction with Dr. F. H. Cooke's report on leprosy published in appendix C of the annual report of the Medical Department for 1926-27.

In September, 1926, a beginning was made by constructing a temporary camp consisting of two native huts.

As admissions were entirely voluntary, patients began to come freely, and soon more huts had to be run up.

At the end of 1926, 40 patients had been admitted and it was considered that the experiment had been a success and that a permanent settlement would justify itself.

A plot of land 26 acres in extent was selected about  $1\frac{1}{4}$  miles from Ho for the permanent settlement.

Meanwhile the temporary settlement was being enlarged and by the end of September, 1927, 144 patients had been admitted and 138 were attending as out-patients. Out-patients were admitted as a vacancy occurred and competition for a vacancy was pathetically keen.

Inmates were maintained at a cost of about 9d. a day and were supplied with a cover cloth, blanket, plate, cup and spoon. They were happy and contented and looked forward anxiously to the time when they could move into the permanent settlement.

The limit of accommodation of the temporary settlement was soon reached and many lepers erected huts for themselves until there were between 140 and 150 residing within the temporary area.

The erection of the permanent settlement was begun in April, 1927. Up to the 31st March, 1928, three compounds with kitchens, the superintendent's quarters, a rest-house and kitchen, and latrines and bath-houses have been completed. Each compound will take 25 cases. The rest-house is for the relatives of patients who are physically unable to feed themselves.



The original scheme provided for four compounds for 100 patients, but this will probably be quite inadequate. There is ample space for extension.

The question of an adequate water supply for the dry season is causing some difficulty. A well is being sunk by the Public Works Department. If this proves a failure, a supply can be taken from the source of an adjacent stream by pipe-line.

The settlement is satisfactorily sanitated.

This note may conclude with an extract from the annual report on the Ho district in which Dr. Cooke writes as follows :—

“ The applicants for treatment for this disease have greatly exceeded expectations, 353 is the number recorded as having attended the out-patient department 95 were admitted to the temporary Settlement, and 213 have been attending fairly regularly as out-patients the rest 66 were unable to stay as they were unable to support themselves.

“ Admissions to the Settlement for the year together with those remaining totalled 173, of these one died, six were cured, 52 improved and were discharged on parole, two ran away, 21 were allowed leave on private matters and have not returned and 15 of those discharged on parole have been re-admitted for further treatment. The average stay of each patient discharged was 292.3 days. Remaining in the Settlement on 31st March, 1928 are 95.

“ It is somewhat early to give a definite opinion as to the value of Alepol, but so far the results obtained here appear to justify the favourable reports that have appeared on the subject.”

# APPENDIX E.

## MOSQUITO PROOFING OF OFFICIALS' QUARTERS.

Province, etc.	Permanent Quarters.	Temporary Quarters.	Bush Quarters.	No. partly protected.	No. completely protected.
Accra .. .. .	260	4	—	9	—
Eastern (other than Accra) .. .. .	76	4	—	3	—
Central .. .. .	45	1	—	—	1
Western .. .. .	205	9	2	2	6
Ashanti .. .. .	137	—	—	2	—
Nothern Territories .. .. .	60	—	—	5	—
Total .. .. .	783	18	2	21	7



## APPENDIX TO REPORT OF SANITARY DEPARTMENT.

## ACCRA WATER SUPPLY.

Chemical analyses were carried out at intervals during the year, the usual samples being taken from the river water, the low-level reservoirs, and after the final filters. As tables of chemical analyses are of little use, save to the expert they have been broadly summarised. The analyses were made during the period April to December, 1927.

2. The water is obtained from the Densu, a river which receives the surface drainage of many villages on its banks whose inhabitants wash themselves and their clothes in the stream, and, in fact, it acts as an open sewer for such villages as are near enough to its banks. Near Accra, the water is pumped into two low-level reservoirs being treated with lime as it passes into the reservoirs. In them the water settles and since the early part of April, a proportion of the river water has been treated with varying amounts of aluminum sulphate and, mixed with the rest of the lime-treated water, has been passed through "degroisseurs" before going on to the final filters. Since 4th December, 1927, 0.25 to one part per million of chlorine has been added to the water after final filtration.

3. The various analyses of the river water naturally show great variation from time to time but the worst results were discovered in May, July and early November. In May, the figures for free ammonia, albuminoid ammonia and oxygen absorbed were 0.012, 0.053 and 0.92, in July 0.002, 0.073 and 1.17 and in November 0.005, 0.072 and 1.02.

Between the 7th and 9th September, the figures were, a trace, 0.18 and 0.27.

These figures give the worst and best results of the various analyses. Striking an average—admittedly a rough one, and one into which too much must not be read—the figures for the raw river water read as follows:—

Free Ammonia.	Albuminoid Ammonia.	Oxygen absorbed.	Total Solids.
0.002	0.045	0.068	21.4

all as parts per hundred thousand.

Roughly speaking the quality deteriorated soon after the rains had begun.

4. As will be noted from the remarks above, the water entering the low-level reservoirs varies enormously. It will be more instructive to set out the averaged results of the lime-treated waters in a small table.

TABLE A.

	Ammonia <sub>2</sub>		Oxygen absorbed.
	Free	Albuminoid	
Average quality Densu river water	0.001	0.016	0.18
Worst quality Densu river	0.008	0.038	0.47

It will now be seen how the quality of the river water is reflected in the results from the reservoirs and how the various figures are improving.

5. The water from the final filters is different in that variation is much less but still a distinct seasonal change occurs. Beginning with the rains the quality steadily and fairly evenly deteriorates till about November.

The average results for the period in question are free ammonia nil, albuminoid ammonia 0.014, and oxygen absorbed 0.16. This is a great improvement on the water in the reservoirs and a still greater one on the river water.

6. The chief indications as to the epidemiological safety of a water supply are the results of bacteriological analyses carried out regularly and carefully to detect the presence or absence of certain classes of bacilli. At Accra these analyses have been done regularly on the water in the low-level reservoirs, the water leaving the final filters, and at the laboratory tap—the latter being to estimate the quality of the water as supplied to the ultimate consumer. These results are embodied in a schedule attached to the end of this report.

7. In last year's report a tabular statement was given of the results of the bacteriological analyses for several years past. This tabular statement is not reported in full in this year's report but this year's results are presented in a similar form so that comparison may be made..

APRIL 1927 TO MARCH 1928.

			Total number of Samples.	Number without B. coli in 100cc.	Number showing B. coli in 100cc.	Number showing in 100cc. or less.	Percentage of Samples showing no B. coli in 100cc.	
Storage Reservoir No 1	..		15	6	6	3	40.0%	Average per- centage 37.0%
Storage Reservoir No. 2	..		12	4	7	1	33.3%	
Final Filter No. 1	..	..	9	7	1	1	77.7%	Average per- centage. 54.9%
Final Filter No. 2	..	..	9	2	7	—	22.2%	
Final Filter No. 3	..	..	10	5	3	2	50.0%	
Final Filter No. 4	..	..	8	6	1	1	75.0%	
Final Filter No. 5	..	..	7	5	2	—	71.4%	
Final Filter No. 6	..	..	8	3	4	1	37.5%	
Laboratory Tap	..	..	51	22	26	3	43.1%	

The summarised results for the last few years are given hereunder :—

Percentage of samples showing no B.coli in 100cc.

Year.		1921	1922	1923	1924-25	1925-26	1926-27	1927-28
Storage Reservoirs ..	..	72.0	57.7	33.3	25.0	62.5	40.0	37.0
Filter Beds ..	..	73.1	79.6	71.1	82.7	78.0	81.1	54.9
Taps in the town ..	..	77.1	38.5	38.4	50.0	63.5	62.3	43.1

During the last three years the same tap has been used for taking samples. These figures show how the bacteriological purity of the water as a whole has diminished while there is very distinct evidence of the drop in purity between the first filters and the consumer.



APPENDIX TO REPORT OF SANITARY DEPARTMENT.  
ACCRA WATER SUPPLY.

BACTERIOLOGICAL EXAMINATION OF SAMPLES FROM RESERVOIRS, FINAL  
FILTERS AND LABORATORY TAPS, APRIL, 1927 TO MARCH, 1928.

+ = Smallest volume of water yielding B. coli.

— = Absence of B. coli in the respective volumes stated at head of columns.

Adopted test of typical B. coli.—Lactose-positive  
Indol-positive.

	Source of Sample.	100cc.	10cc.	1cc.	0.1cc.
April 7	Laboratory Tap .. ..	+	—		
„	Low Level Reservoir No. 2	+	—		
„	Final Filter No. 2 .. ..	+	—		
14	Laboratory Tap. .. ..	+	—		
„	Final Filter No. 3 .. ..	—			
21	Final Filter No. 4 .. ..	—			
„	Low Level Reservoir No. 2	+	—		
„	Laboratory Tap. .. ..	—			
28	Final Filter No. 5 .. ..	—			
„	Laboratory Tap .. ..	—			
May 5	Final Filter No. 6 .. ..	+	—		
„	Low Level Reservoir No. 1	+	—		
„	Laboratory Tap .. ..	—			
12	Final Filter No. 1 .. ..	—			
„	Laboratory Tap .. ..	—			
19	Low Level Reservoir No. 1				+
„	Final Filter No. 2 .. ..	+	—		
„	Laboratory Tap .. ..		+		—
26	Final Filter No. 3 .. ..	+	—		
„	Laboratory Tap .. ..	—			
June 2	Laboratory Tap .. ..	+	—		
„	Final Filter No. 4 .. ..	+	—		
„	Low Level Reservoir No. 1	+	—		
9	Laboratory Tap .. ..	+	—		
„	Final Filter No. 6 .. ..	+	—		
16	Laboratory Tap .. ..	—			
„	Final Filter No. 1. .. ..		+	—	
„	Low Level Reservoir No. 1		+	—	
23	Laboratory Tap .. ..	+	—		
„	Final Filter No. 2 .. ..	+	—		
30	Final Filter No. 3 .. ..	+	—		
„	Laboratory Tap .. ..	+	—		
„	Low Level Reservoir No. 2		+	—	
July 7	Laboratory Tap .. ..	+	—		
„	Final Filter No. 5. .. ..	+	—		
14	Final Filter No. 6 .. ..	+	—		
„	Storage Reservoir No. 2 ..		+	—	
„	Laboratory Tap .. ..	+	—		
21	Final Filter No. 1 .. ..	+	—		
„	Laboratory Tap .. ..	+	—		
28	Laboratory Tap .. ..	+	—		
„	Low Level Reservoir No. 2		+	—	
„	Final Filter No. 2 .. ..	+	—		
Aug., 4	Laboratory Tap .. ..	+	—		
„	Final Filter No. 3 .. ..	+	—		
11	Laboratory tap .. ..	+	—		
„	Low Level Reservoir No. 2		+	—	
„	Final Filter No. 3 .. ..	+	—		
19	Laboratory Tap .. ..		+	—	

Date	Source of Sample.	100cc.	10cc.	1cc.	0.1cc.
Aug. 19	Final Filter No. 4 .. ..				+
25	Laboratory Tap .. ..	+	—		
"	Final Filter No. 5 .. ..	+	—		
"	Low Level Reservoir No. 2' .. ..			+	—
Sept. 1	Final Filter No. 4 .. ..	—			
"	River water after treatment .. ..		+	—	
2	Low Level Reservoir No. 1 .. ..	—			
"	Water pumped from river .. ..			+	—
8	Low Level Reservoir No. 1 .. ..	—			
"	Final Filter No. 1 .. ..	—			
9	Laboratory Tap .. ..	—			
15	Laboratory Tap .. ..	+	—		
"	Final Filter No. 2 .. ..	+	—		
22	Laboratory Tap .. ..	+	—		
"	Low Level Reservoir No. 1 .. ..	+	—		
"	Final Filter No. 3 .. ..	—			
29	Laboratory Tap .. ..	+	—		
"	Final Filter No. 4 .. ..	—			
Oct. 6	Laboratory Tap .. ..	+	—		
"	Final Filter No. 5 .. ..	—			
"	Low Level Reservoir No. 1 .. ..	+	—		
13	Laboratory Tap .. ..		+	—	
"	Final Filter No. 6 .. ..	+	—		
20	Laboratory Tap .. ..	+	—		
"	Low Level Reservoir No. 1 .. ..	+	—		
"	Final Filter No. 1 .. ..	—			
27	Final Filter No. 2 .. ..	+	—		
"	Laboratory Tap .. ..	+	—		
Nov. 3	Low Level Reservoir No. 1 .. ..				+
"	Laboratory Tap .. ..	+	—		
"	Final Filter No. 3 .. ..		+	—	
10	Laboratory Tap .. ..	+	—		
"	Final Filter No. 4 .. ..	—			
17	Laboratory Tap .. ..	+	—		
"	Low Level Reservoir No. 2 .. ..				+
"	Final Filter No. 5 .. ..	+	—		
24	Laboratory Tap .. ..	+	—		
"	Final Filter No. 6 .. ..		+	—	
Dec. 1	Laboratory Tap .. ..	—			
"	Low Level Reservoir No. 2 .. ..		+	—	
"	Final Filter .. ..	—			
8	Laboratory Tap .. ..	+	—		
"	Final Filter No. 2 .. ..	—			
15	Laboratory Tap .. ..	—			
"	Storage Reservoir No. 2 .. ..	+	—		
"	Final Filter No. 3 .. ..	—			
22	Laboratory Tap .. ..	—			
"	Final Filter No. 4 .. ..	—			
29	Storage Reservoir No. 2 .. ..	—			
"	Laboratory Tap .. ..	—			
"	Final Filter No. 5 .. ..	—			
1928					
Jan. 5	Final Filter No. 6 .. ..	—			
"	Laboratory Tap .. ..	—			
12	Storage Reservoir No. 2 .. ..	+	—		
"	Laboratory Tap .. ..	—			
"	Final Filter No. 1 .. ..	—			
19	Laboratory Tap .. ..	—			
"	Final Filter No. 2 .. ..	+	—		
26	Laboratory Tap .. ..	—			
"	Storage Reservoir No. 1 .. ..	—			
"	Final Filter No. 4 .. ..	—			



Date	Source of Sample			100cc.	10cc.	1cc.	1.1cc
Feb. 2	Final Filter No. 5	..	..	—			
„	Laboratory Tap	..	..	+	—		
9	Laboratory Tap	..	..	+	—		
„	Storage Reservoir No. 1	..	..	—			
„	Final Filter No. 6	..	..	—			
16	Laboratory Tap	..	..	—			
„	Final Filter No. 1	..	..	—			
23	Laboratory Tap	..	..	—			
„	Storage Reservoir No. 1	..	..	—			
„	Final Filter No. 3.	..	..	—			
Mar. 1	Final Filter No. 5	..	..	—			
„	Laboratory Tap	..	..	—			
8	Laboratory Tap	..	..	—			
„	Final Filter No. 6	..	..	—			
„	Storage Reservoir No. 1	..	..	—			
15	Laboratory Tap	..	..	—			
„	Final Filter No. 1	..	..	—			
22	Laboratory Tap	..	..	—			
„	Final Filter No. 2	..	..	—			
„	Storage Reservoir No. 1	..	..	+	—		
29	Laboratory Tap	..	..	—			
„	Final Filter No. 3	..	..	—			

APPENDIX TO REPORT OF SANITARY DEPARTMENT  
SEKONDI WATER SUPPLY.

There are only the bacteriological analyses from April, 1927, to March, 1928, available and a schedule is attached showing the various results. All are from the laboratory tap.

2. It will be seen that the worst results are given from the middle of April to the middle of September. There were 15 samples taken during that period of which 6 showed no B. coli in 100 cc. During the rest of the year 19 samples were taken of which 17 showed no B.coli in 100cc.

For purposes of comparison with other years, the figures, such as they are, for the times during which systematic analyses were being made are summarised below :—

	Year.	1922. First four months.	Sept. 1926, March, 1927	April, 1927 March, 1928.
Laboratory and other taps and standpipes.	Number of samples taken	16	32	34
	Number showing no B. coli in 100 cc.	15	7	22
	Percentage of samples with no B. coli per 100 cc.	93.75	21.9	64.4

3. The Anankwan water from the reservoir is treated with approximately 10 parts per 100,000 Aluminium Sulphate before filtration and 0.3 parts of lime per 100,000 after filtration. While pumping is going on liquid chlorine is added in the proportion of 0.5 parts per million.



## SEKONDI WATER SUPPLY.

## BACTERIOLOGICAL EXAMINATION.

Date	Source of Sample			Result.			Remarks
				B. coli found in			
				100cc.	10cc.	1cc.	
April 7	Laboratory Tap	..	—				
14	" "	..	—				
22	" "	..	+		—		
28	" "		+		—		
May 12	" "	..	—				
19	" "	..	+		—		
June 2	" "	..	—				
9	" "	..	+		—		
16	" "	..	—				
30	" "	..	—				
July 7	" "	..	—				
21	" "	..	—				
28	" "	..	+		—		
Aug. 11	" "	..			+	—	
18	" "	..	+				
Sept. 1	" "	..	+		—		
15	" "	..	+		—		
22	" "	..	—				
29	" "	..			+	—	B. lactis aerogenes present in 100cc.
Oct. 13	" "	..	—				B. pyocyaneus found in 10 cc.
20	" "	..	—				
Nov. 3	" "	..	—				
10	" "		—		—		
17	" "	..	+				
24	" "	..	—				
Dec. 8	" "	..	—				
15	" "	..	—				
28	" "	..	—				
1928							
Jan. 5	" "	..	—				
12	" "	..	—				
19	" "	..	—				
Feb. 2	" "	..	—				
9	" "	..	—				
21	" "						

Total 34 :— 22 with no B. coli in 100cc = 62.9%.  
 9 with B. coli in 100cc.  
 2 with B. coli in 10cc.

## APPENDIX G.

SESSIONAL PAPER XXVII. 1927-28.

## THE OUTBREAK OF YELLOW FEVER IN ACCRA.

MARCH—JUNE, 1927.

## A.— HISTORY OF PREVIOUS EPIDEMICS.

1. Until the outbreak that forms the subject of this report, Accra had remained free from any serious incidence of yellow fever for over fifteen years.

2. The graph facing this page affords an indication of the prevalence of the disease in Accra and in the Colony as a whole since 1910, when an epidemic attended by grave loss of life occurred at Sekondi.

3. As can be seen from the graph and from Table I given below, the number of cases of yellow fever reported was very much larger in 1926-27 than had ever before been recorded and this is only taking into account those cases actually seen and not the cases and deaths\* estimated by the members of the Rockefeller Yellow Fever Commission to have occurred at Asamankese prior to the discovery of the outbreak in July, 1926.

4. Further, it will be seen that the greater proportion of the persons affected were Africans. The members of this race had previously been looked upon to a large extent, without any really scientific basis, as immunes.

5. Various explanations have been advanced as to the sudden large increase in the number of cases of the disease but none are more than hypotheses. It is suggested that the absence of the disease for a considerable period may have resulted in a race of Africans growing up who do not possess the relative immunity from the disease which existed in their forebears. This theory is difficult to accept for it is a remarkable fact that cases are very seldom recognised in children under five

TABLE I.

Year.	Cases			Deaths.			Cases.	Deaths
	European	African	Syrian	European	African	Syrian	Total.	Total.
1910 ..	12	3	—	11	3	—	15	14
1911 ..	6	3	—	5	—	—	9	5
1912 ..	3	7	—	3	—	—	10	3
1913 ..	10	10	—	5	2	—	20	7
1914 ..	9	10	—	4	5	—	19	9
1915 ..	1	1	—	1	1	—	2	2
1916 ..	5	1	—	4	1	—	6	5
1917 ..	3	2	—	3	2	—	5	5
1918 ..	2	2	—	1	—	—	4	1
1919 ..	6	5	—	5	2	—	11	7
1920 ..	1	1	—	1	—	—	2	1
1921 ..	3	1	—	3	1	—	4	4
1922 ..	4	6	—	4	4	—	10	8
1923 ..	15	4	—	14	2	—	19	16
1924 ..	7	—	1	5	—	1	8	6
1925 ..	3	3	1	—	3	1	7	4
1926 ..	8	57	—	5	13	—	65	18
1927 ..	14	88	5	10	25	5	107	40
Total ..	112	204	7	84	64	7	323	155

Suspicious cases not definitely diagnosed as yellow fever are not included in the above table.

\*Over one thousand cases and over a hundred deaths.



years of age, the greater proportion occurring in young adults and middle aged persons who would be more likely to possess such inherited immunity that might exist.

6. It is matter of common knowledge that the opening up of the country by the improvement of communications has not only facilitated the dissemination of disease but also its recognition.

7. Other factors bearing upon the better recognition of disease include the improved registration of deaths and the increased medical and sanitary personnel.

8. The inadequacy of the last mentioned line of defence against epidemic diseases is illustrated by the outbreak in Asamankese in 1926, when over a thousand cases and over a hundred deaths are believed by the Rockefeller Yellow Fever Commission to have occurred prior to the discovery of the outbreak.

9. In view of the fact that conditions in 1926, no doubt influenced the course of affairs in the outbreak forming the subject of this report, it would appear to be worth while detailing the localities from which yellow fever was reported during the period January, 1926. to March, 1927.

10. On the 21st of March, 1926, a case of yellow fever occurred in a European in Nsawam, a large commercial centre about 23 miles by road north east of Accra.

11. In all, three European and four African cases, each with two deaths, were reported from Nsawam.

12. In May, 1926, reports of yellow fever in a European and an African were received from Cape Coast and Saltpond.

13. On the 3rd of July, a European died from the disease in Accra.

14. He had visited Nsawam and Asamankese where he is believed to have been infected. A Kroo boy from Nsawam died a fortnight later, a third fatal African case occurred on the 19th of July.

15. Early in the same month a definite case of yellow fever was traced to Asamankese, an important town about twenty-eight miles by direct line north west of Nsawam.

16. Further investigations led to the discovery that a serious epidemic had been raging at Asamankese during the preceding two months.

17. It is a moot point whether the disease existed first at Nsawam which has been the scene of many outbreaks or at Asamankese.

18. In November, 1926, a fourth fatal case occurred in Accra but the European in question is believed to have been infected in Akuse although no primary source could be located.

19. During January, 1927, an outbreak occurred at Suhum, an important cocoa centre on the Nsawam-Kibi road and situated twenty miles by direct line north-east of Asamankese.

20. The possibility of Suhum having been infected from Asamankese cannot be overlooked, though the interval that elapsed between the first recognised case at the former and the last case at the latter centre might suggest infection through intermediate sources.

21. In February, 1927, a Syrian resident of Winneba died at Cape Coast.

22. The source of infection was not discovered but considerable lorry traffic passes up and down between the Suhum-Asamankese area and Winneba.

23. From the above, it will be seen that scattered outbreaks, in two cases assuming epidemic proportions, occurred within easy reach of Accra during the twelve months preceding the outbreak which forms the subject of this report.

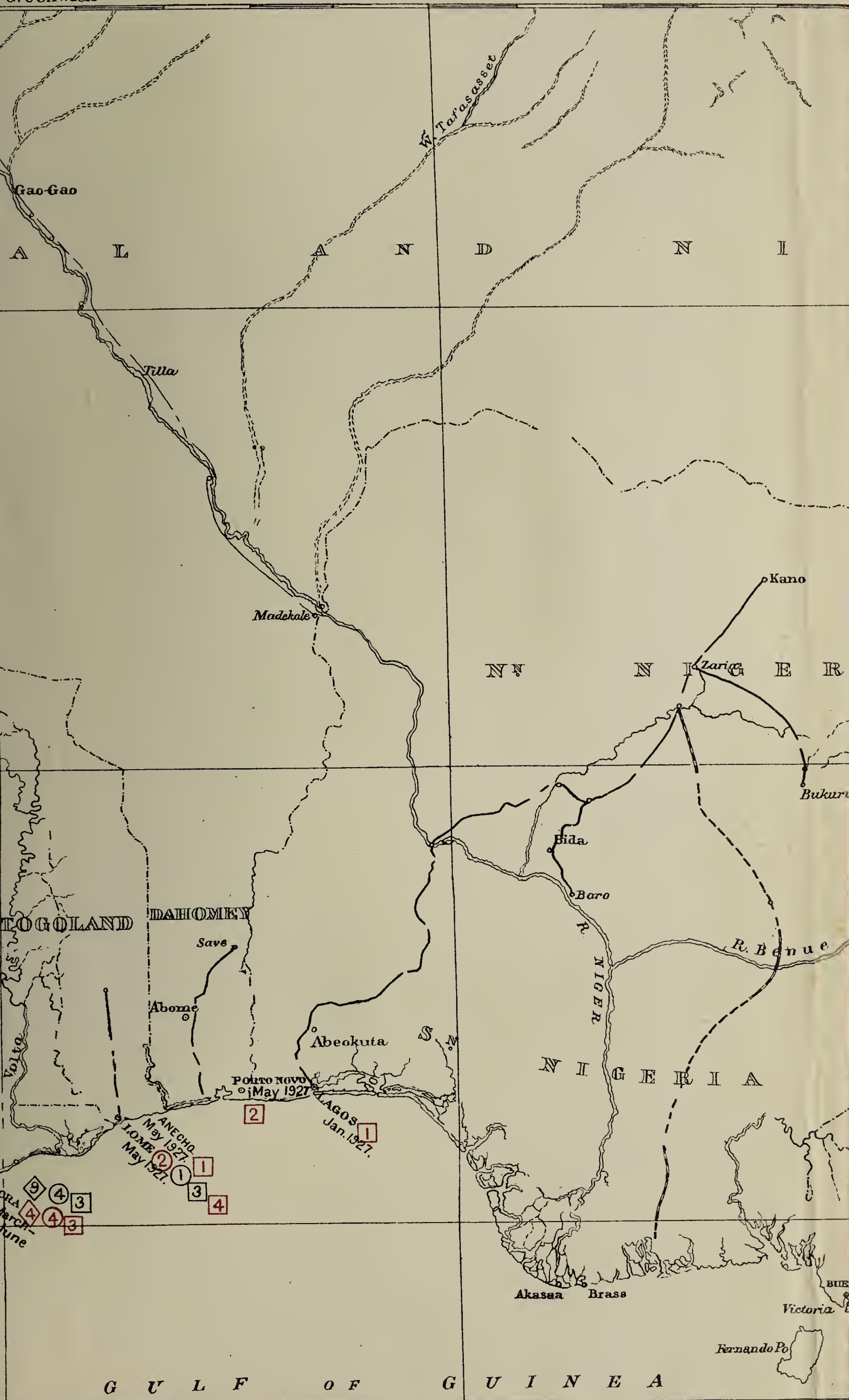
24. As might be expected in so important a centre, the inter-communications between Accra and up-country stations were highly developed, the railway and lorry roads bringing Accra within an hour or two of a net-work of populous centres.

#### B.—HISTORY OF PRESENT EPIDEMIC.

25. It will be readily appreciated that there was no lack of material in areas not far distant, during the few months prior to the epidemic, to afford sources of infection for Accra and it was hardly surprising that a case occurred in March, 1927.

Greenwich

5



0 Greenwich

5







26. The first case of the series was a Syrian aged 24 who lived in the High Street and kept a store in Station Road. He was in his first tour in West Africa and is alleged to have spent the whole of the thirty months of it in Accra.

27. A description of his case may serve as the type met with in the Syrians attacked during the outbreak.

28. On the 27th of March, 1927, he complained of a chill and frontal headache.

29. He was seen next day by a medical practitioner who found him flushed and with a temperature of  $102^{\circ}$  and pulse rate of 80.

30. On the following day the deceased complained of epigastric pain and vomited bilious material. His temperature and pulse rate were  $101.4^{\circ}$  and 70 respectively. His face was very flushed and his conjunctivae had an icteric tint.

31. On the 30th, jaundice was marked, vomiting of "coffee grounds" and melaena occurred. The deceased became drowsy and later delirious.

32. His temperature and pulse rate were  $100^{\circ}$  and 62 respectively. As on previous days no urine was obtainable, specimens having been thrown away by mistake. Death took place at 11.50 p.m. on this day.

33. The following conditions were noted at the autopsy:—

*Body.*—Well nourished, marked jaundice, sclerae yellowish green. Black vomit seen escaping from mouth, melaena evident.

*Lungs.*—Very congested, petechiae on inter-lobal surfaces, haemorrhages into substance of lung.

*Heart.*—Pale and flabby with petechiae on inner surfaces.

*Liver.*—Slightly enlarged, pale yellow with slight reddish tinge, soft and greasy, oily on section.

*Kidneys.*—Enlarged, pale and flabby looking.

*Spleen.*—Congested, diffuent, Malpighian bodies stand out.

*Stomach.*—Full of black vomit, minute haemorrhages into mucosa over whole surface, more intense at pyloric end. First part of duodenum similarly affected.

*Bladder.*—Two ounces of urine obtained which gave quarter solidity of test tube (albumen) on boiling and adding drop of acetic acid.

34. A second Syrian, this time a girl of 24, fell sick in a house in Lutterodt Street within about fifty yards of the first infected premises.

35. The two families had mingled together and the source of infection was no doubt the same for both of the victims.

This case ended fatally on the 12th of April.

36. On the 18th of April, a young Syrian girl of five years fell sick in a house in Orgle Street situated about one hundred and seventy yards from the previously infected area.

37. The families had intermingled freely and it is probable that the first case of the present series was the source of infection in this instance. The child died on the 22nd of April.

38. The fourth case was a Ga (African) boy of 13 years of age, resident at the north end of Christiansborg, about two miles from the area in which the previous three cases had been found. In this instance there would appear to be little doubt but that the boy was infected from a cousin who had returned to Accra three weeks previously from the Somanya-Odumasi district where an outbreak of yellow fever had been discovered in March. The cousin had had a severe illness in Christiansborg attended by fever, vomiting and gastralgia immediately after his return from up-country.

39. The onset in case No. 4 was on the 21st of April, and as the boy eventually recovered a few clinical details may be of interest.

21st April. Fever and vomiting



23rd April. Pain in abdomen chiefly in right hypochondrium, fever worse, vomited black material, melaena.

25th April. Temperature  $101.8^{\circ}$ , pulse 96, respirations 16, conjunctivae definitely jaundiced, tongue coated with thick yellowish white fur in centre of dorsum but cleaner at edges and tips, tenderness over liver and only slightly over epigastrium. Urine, acid, albumen (Esbach) 0.3 per cent, bile pigments and salts, bile stained granular and hyaline casts.

Blood count:—Red corpuscles 6,050,000, white corpuscles 8,251, colour index 0.91.

Vomited blood-stained vomit.

26th April. Very restless, pulse weak and almost impalpable at intervals. No vomiting but passed black, but not typically tarry stool. Albumen 0.3 per cent.

27th and 29th April. Improved, albumen 0.19 per cent and 0.01 per cent

30th April. Albumen less than 0.01 per cent, convalescence.

40. On the 1st of May, a Nigerian cook in the employ of a European resident in Plange Lane fell sick.

41. This boy slept at a house in Korlina Road and the source of infection appeared obscure until it was discovered that he associated with one of the boys working in the house in Orgle Street where the third case was found. The boy recovered.

42. On the same day a Twi (African) student at the Accra Training College fell sick and was removed to hospital where he later recovered.

43. The source of infection could not be definitely established for he left Accra for Anum on the 26th of April, from there went to Odumasi on the 27th, to Koforidua on the 28th and returned to Accra on the 30th.

44. In all these areas cases of yellow fever were discovered within the following two months. The source of infection was, therefore, a matter of doubt.

45. The first European case of the present series was taken ill on the 2nd of May. He had been resident for the previous ten months in Plange Lane. His cook (case No. 5) had fallen ill the day previously and it is possible that both master and man were infected by the servant employed in the household of case No. 3 since this servant was in the habit of visiting the house in Plange Lane and may have suffered from a mild attack.

46. The following clinical notes relating to this European case are worth recording.

2nd May. Malaise, anorexia, frontal headache. Temperature in the evening  $104^{\circ}\text{F}$ . Restless night, insomnia, frequency of micturition.

3rd May. Headache and frequency of micturition, 2 or 3 ounces of urine passed every half hour. Temperature varied between  $103^{\circ}$  and  $105^{\circ}$ .

4th May, 11.30 a.m. Temperature and pulse  $104^{\circ}$  and 80 respectively. Blood smear negative for parasites, marked polychromasia. 2 p.m. Admitted to hospital—walked into ward. Mentally clear but very anxious, tremors of face and hands, face mottled, rash of "prickly heat" on trunk and limbs, tongue slightly coated, cleaner at tip and edges, very tremulous and cyanosed, eyes deeply injected but no icterus, gums unhealthy, septic and congested, lungs normal, heart sounds regular but weak, abdominal tenderness, liver not markedly enlarged downwards, spleen one finger's breadth below costal margin, urine sp. gr. 1006, very acid, clear, deep amber, heavy cloud of albumen on boiling and after addition of dilute acetic acid, no casts and no bile pigment.

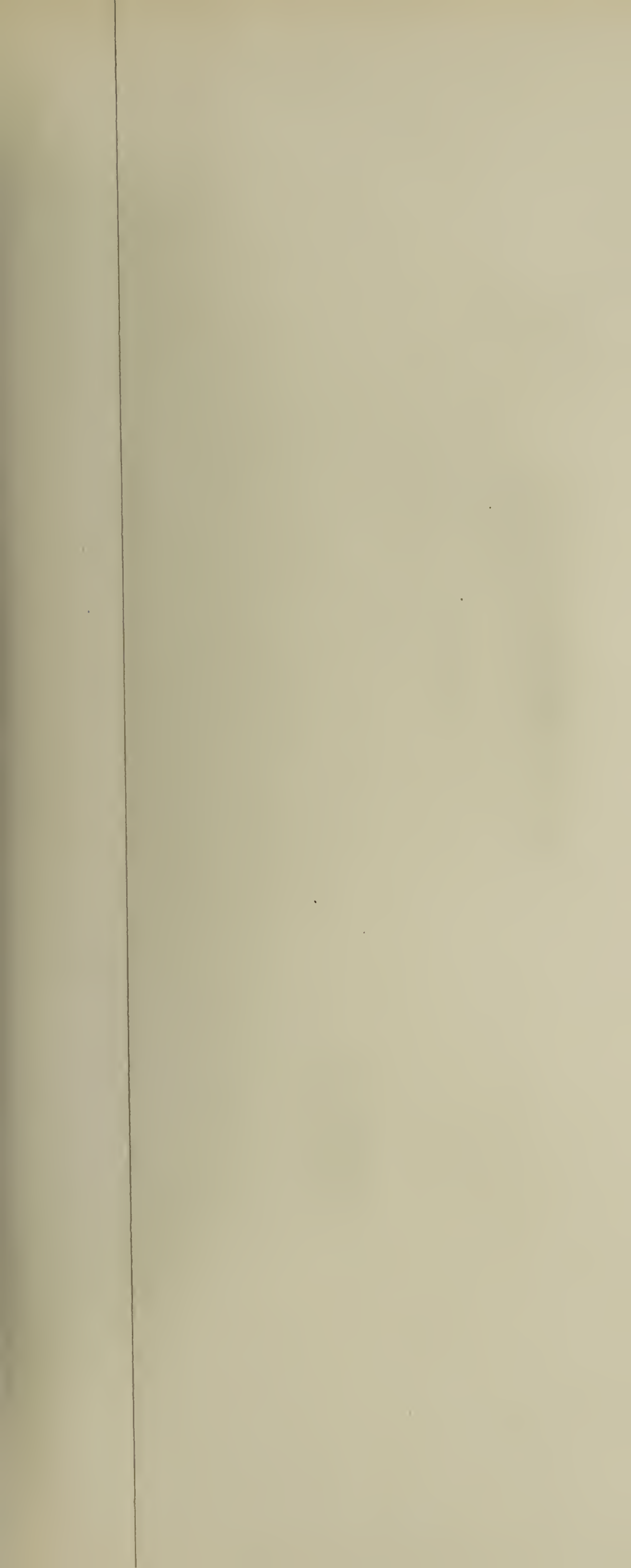
7 p.m. Mental confusion, very restless.

9.30 p.m. Delirious, very restless, vomited on three occasions the vomit being dark brown and containing flecks of blood.

10 p.m. Comatose, temperature continued to rise in spite of cold sponging, heart failure set in. The rash noted earlier in the day became purple in colour.

11 p.m. Temperature  $108.2^{\circ}$ , pulse small, weak and very rapid.

11.25 p.m. Death.





**REFERENCE**

16 = Cases of Yellow Fever

① = " " " " which ended fatally

— = Approximate land boundaries of area from which all Europeans and Syrians were evacuated.

**Scale**

FEET 1000 500 0 1000 2000 3000 4000 5000 FEET

Survey H. Q. Accra, 192



47. The following conditions were noted at the autopsy :—

*Body.*—Well developed—tendency to abdominal obesity, rigor mortis marked, post mortem lividity well marked, slight jaundice, eyes showed green yellow jaundice.

*Lungs.*—Intensely haemorrhagic, many petechiae.

*Heart.*—Soft, flabby, fatty looking and jaundiced, petechiae round aorta, ecchymotic haemorrhage of chordae.

*Liver.*—Enlarged, fatty and oily, boxwood in appearance.

*Kidneys.*—Fatty looking, congested.

*Spleen.*—Congested, malarial like.

*Stomach.*—Black vomit present, numerous petechiae and submucous haemorrhages.

*Bladder.*—Urine gave one twelfth solidity for albumen.

48. After a further interval of twelve days a third series of cases occurred.

49. On the 16th of May, two European ladies (cases No. 8 and 9) resident in Horse Road at a distance of less than two hundred yards from premises in which case No. 3 had been infected, fell sick and were removed to hospital.

50. It is noteworthy that the writer made strong representations verbally and in writing on the 7th of May, to the Agent of the firm occupying the premises where the ladies lived, to remove together with his assistants and their families from the infected area. This advice was not followed.

51. Case No. 8 was seen at 1.15 p.m. on the 16th and admitted to hospital at once.

52. A brief description of her case may be given in view of the fact that she was watched carefully by the Medical Specialist from early on the first day of the disease. 16th May (early morning). Aching in thighs and back, temperature began to rise at 10 a.m. and was accompanied by moderate frontal headache.

At 1.15. Temperature 102.7°, pulse 130, no flushing of face, no injection or icterus of conjunctivæ, tongue clean and flabby, gums at base of artificial incisors slightly inflamed and septic, heart and lungs normal, no abdominal tenderness, no enlargement of liver or spleen.

At 2.30 p.m. Severe headache. Urine, light coloured, neutral, sp. gr. 1010, no albumen. Blood smear, no parasites. At 9 p.m. Urine, very acid, no albumen.

17th May. Severe frontal headache, pain in right ear and gums, face a little flushed, eyes deeply injected, slight photophobia, no icterus, tongue coated, rather dry, cleaner at tip and edges, no abdominal tenderness or vomiting. Urine, very acid, sp. gr. 1017, no albumen.

11. a.m. Urine, faint cloud of albumen.

9 p.m. Urine, heavy cloud of albumen.

18th May. Much retching but only little dirty cream coloured vomit flecked with fresh blood probably from gums which oozed a little. Urine, very little, albumen, 1 gram per litre.

6 p.m. Vomited once, very acid fluid containing material of consistence and colour of coffee custard with small flecks of blood.

Slight conjunctival interus.

19th May. Vomited " coffee ground " material several times during night, pain across abdomen, definite icterus with few purpuric spots on chin.

Rectal enema resulted in very dark motion and, later, a motion containing clots of blood. Suppression of urine.

20th May. Vomiting incessant during night, retained consciousness till midnight then mild delirium.

Convulsions and death at 4 a.m.



53. Case No. 9 followed a similar course with suppression of urine on the 20th of May, and death on the 21st of May. Definite and marked jaundice appeared on the 19th of May, and there was considerable epigastric tenderness but vomiting was slight and without "coffee ground" material.

54. The source of infection in these two cases and also probably in case No. 10, their steward, was possibly traceable to the premises where case No. 3 had died on the 22nd of April.

55. After a short interval of four days, four Africans were found to be suffering from the disease.

Of these, one lived in Hansen Road close to the premises in Korlina Road where case No. 5 may have been infected.

56. A second had arrived from Koforidua on the 23rd of May and had slept in Messrs Pickering & Berthoud's premises in the High Street. A third lived in Station Road in quarters situated within two hundred yards of those in which two Europeans and a steward boy had fallen sick and within fifty yards of the house where case No. 3 had died.

57. The fourth lived in premises equidistant from where case No. 3 was infected and those from which cases No. 8, 9 and 10 were removed.

58. On the following day a last African case was discovered in premises in Station Road, adjoining those from which case No. 13 had been removed.

59. The last case of the present series was a young Syrian woman of 30 years of age who had lived in Accra for the five months which represented the whole of her first tour.

60. The woman had delayed leaving the infected area for Adabraka, a suburb of Accra, until two days after the order for evacuation had been published.

61. The premises she had occupied until the 23rd of May, were situated in close proximity to several of those where cases of yellow fever had occurred.

62. The deceased fell sick on the 25th of May, and died on the 29th of May.

63. The following table epitomises the various points in connection with the cases.

TABLE II.

Case No.	Race.	Age.	Sex.	No. of tour	No. of months. resident.	Date of onset of illness.	Date screened.	Date diagnosed.	Date of Death.
1. Syrian ..	.. ..	28	Male	First	30	26/3/27	30/3/27	30/3/27	30/3/27
2. Syrian ..	.. ..	24	Female	First	36	7/4/27	11/4/27	12/4/27	12/4/27
2. Syrian ..	.. ..	5	Female	Second	18	18/4/27	22/4/27	22/4/27	22/4/27
4. African ..	(Ga) ..	13	Male	—	—	21/4/27	25/4/27	25/4/27	Recovered
5. African ..	(Ebo, Nigerian)	18	Male	—	—	1/5/27	4/5/27	4/5/27	Recovered
6. African ..	(Twi) ..	19	Male	—	—	1/5/27	3/5/27	3/5/27	Recovered.
7. European ..	(British) ..	43	Male	Tenth	10	2/5/27	4/4/27	4/5/27	4/5/27
8. European ..	(German) ..	36	Female	Second	7	16/5/27	16/5/27	18/5/27	20/5/27
9. European ..	(German) ..	46	Female	First	7	16/5/27	16/5/27	18/5/27	21/5/27
10. African ..	(Calabar, Nigerian)	32	Male	—	—	15/5/27	20/5/27	20/5/27	20/5/27
11. African ..	(Kroo) ..	36	Male	—	—	20/5/27	24/5/27	24/5/27	24/5/27
12. African ..	(Kroo) ..	20	Male	—	—	21/5/27	24/5/27	24/5/27	26/5/27
13. African ..	(Fanti) ..	13	Male	—	—	20/5/27	24/5/27	24/5/27	Recovered.
14. African ..	(Togoland)	23	Male	—	—	16/5/27	24/5/27	24/5/27	Recovered.
15. African ..	(Ga) ..	20	Male	—	—	21/5/27	25/5/27	25/5/27	28/5/27
16. Syrian ..	.. ..	30	Female	First	5	25/5/27	26/5/27	29/5/27	29/5/27
*17. European ..	(German) ..	27	Male	First	12	18/9/27	20/9/27	20/9/27	23/9/27

\*Addendum—subsequent to compilation of report.



## C.—DETAILS OF CASES.

64. (a) Race :—Nine Africans, four Syrians and three Europeans.

Of the Africans, four were natives of the Gold Coast and five natives of other West African Colonies.

65. (b) Age :—TABLE III.

Age Type of Case.	5—15,		15—25,		25—35,		35—45,		45 and over		Total.
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
Severe .. ..	2	—	3	—	—	—	—	—	—	—	5
Fatal .. ..	—	1	2	1	2	1	2	1	—	1	11
Total .. ..	2	1	5	1	2	1	2	1	—	1	16

While young adults formed the greater number of cases, the case mortality was lower than in the other age groups. It is significant that only three cases were recognised in children under fifteen years of age.

66. (c) Sex :—

Eleven males and five females were affected but it must be remembered that only five cases occurred in persons born in the Gold Coast and that it is the exception rather than the rule for immigrants to bring their womenfolk with them and thus there is a preponderance of men in the ports and chief centres of the Colony.

## D.—PERIOD OF RESIDENCE ON THE GOLD COAST.

67. It is significant that of the seven Europeans and Syrians who died, four were in their first tour, two were in their second tour, and only one had spent more than two tours in West Africa.

68. The figures are somewhat small to allow of conclusions being drawn but the possibility of mild, unrecognised attacks in so-called “ non-immunes ” conferring some degree of protection cannot be excluded.

69. Further in spite of the overwhelming proportion of persons of Ga nationality in Accra, it is noteworthy that only two cases were reported in this tribe and that five out of the nine Africans were immigrants from other parts of West Africa.

70. The word “ immune ” as applied to the indigenous native is quite obviously a misnomer since over a thousand would appear to have suffered from the disease in 1926-27 but the disease certainly runs a milder course among the indigenous population.

71. It is suggested that the prevalence of yellow fever in coast towns in the Gold Coast for centuries has resulted in a certain degree of local racial immunity.

72. On the other hand, very little is known of the pathology and symptomatology of the disease in infants and children and it is not improbable that unrecognised cases of the disease occur which may result in death or in partial or complete protection giving rise to a certain degree of racial immunity.

73. In inland areas to which the disease has spread latterly—unless, indeed, it has been prevalent but undiscovered owing to shortage of staff—the local degree of immunity would naturally be less.

74. In connection with the possibility of unrecognised cases in young children, the following table provides food for thought, more particularly in view of the extensive infant welfare schemes, the improvement in sanitary conditions and the spread of education that has taken place in the past seven years.

75. Percentage of infant deaths to the total deaths at all ages.

TABLE IV.

1920. 22	1921. 19	1922-23. 23	1923-24. 25	1924-25. 20	1925-26. 23	1926. 23





90

80

70

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10

1910.

1911.

1912.

1913.

1914.

1915.

1916.

1917.

1918.

1919.

1920.

1921.

1922-23.

1923-24.

1924-25.

1925-26.

1926-27.

1927-28.

- = Number of cases of yellow fever in whole of Gold Coast Colony. (1 small square = 1 case).  
 ○--○ = Number of deaths from yellow fever in whole of Gold Coast Colony. (1 small square = 1 death).  
 ○-.-○ = Number of cases of yellow fever in Accra only. (1 small square = 0.2 cases).  
 ○...○ = Number of deaths from yellow fever in Accra only. (1 small square = 0.2 deaths).  
 ✱ includes first case in Accra series who died 30.3.27.

Reproduced at Survey H.Q. Accra, 1928.  
 (April-June)



## E.—TYPE OF DISEASE.

76. Since this report is written from the public health standpoint, it is not intended that a complete clinical picture of the disease should be given.

77. Two main types of the disease were seen during the outbreak under review.

78. In the non-fatal type, the onset was sudden and was accompanied by a degree of prostration out of all proportion to the severity of the symptoms.

79. In the five non-fatal cases that occurred, none of the patients were seen on the first or second day and only one was seen on the third day. The following, however, is a summary of the signs and symptoms of these cases. Severe headache, backache, anorexia, insomnia, fever not above 102°F, pulse relatively slow and tendency to Faget's type. Vomiting and epigastralgia were variable symptoms.

80. In one case that recovered vomiting did not occur. In a second vomiting commenced early and was said to be black on the third day but this statement could not be verified.

81. Hæmorrhage from mucous membranes was present in the form of slight bleeding from the gums. One of the cases that recovered was said to have had melæna while another had a hæmoptysis.

82. Jaundice was present and lasted two weeks in the cases that recovered but the date of its appearance was not ascertained.

83. Albuminuria was a constant accompaniment. The date of onset was not observed but the duration was presumed to be about a week.

As much as 0.3 per centum (Esbach) of albumen was measured in one case while the percentage fell to less than 0.01 in six days. Bile stained, granular casts were observed.

84. Melæna was a variable symptom.

85. No protozoa were seen and the leucocyte count varied between normal and a slight leucopenia.

86. Rashes were not seen in this type of case.

87. Eleven of the cases in the outbreak were fatal.

88. The signs and symptoms resembled those described above but were more pronounced in character.

89. Brief descriptions are given below of typical fatal cases occurring in Europeans and Syrians.

90. In the two fatal cases in Europeans seen from the first day of the disease, severe frontal headache and pains in the loins and thighs were complained of.

91. Conjunctival injection was slight in one but marked in the other on the second day.

92. Jaundice was noticed on the second day in one and on the evening of the third day in the other.

93. Epigastric tenderness was complained of on the fourth day but in one only as the result of vomiting. Vomiting took place on the third day in one case and on the fifth day in the other. In only one of the two was there altered blood in the vomit.

94. Constipation was present in both cases.

95. The temperature rose above 104°F on the second day in one and on the third day in the other. The pulse varied from 70 to 120 in one and from 90 to 130 in the other.

96. In neither was Faget's sign present.

97. Both the deceased wore an anxious and alert expression and both suffered from insomnia.

98. One remained conscious to the end while the other had mild delirium on the night of her death followed by convulsions.

99. In both albuminuria commenced on the second day and increased rapidly until suppression on the third day in one and on the fourth day in the other.



Granular casts and trace of bile were present.

100. Petechial spots and hæmorrhages from the gums, rectum and stomach were noted in one, while no rash and only a single epistaxis were noted in the second.

101. Blood smears showed no protozoa and normal leucocyte counts.

102. Death occurred on the fifth day in one and on the sixth day in the other.

103. In one of the fatal African cases while no vomiting occurred during life-time, a quantity of "coffee ground" material was found in the stomach after death.

104. Further, in a fatal Syrian case no icterus was ever seen though the deceased lived for five days.

105. The above details are given to emphasise the diversity of signs and symptoms.

#### F.—DURATION OF ILLNESS.

106. Of the patients who recovered the majority were convalescent by the tenth day and had apparently regained their normal health within a fortnight of the onset.

107. In concurrent epidemics in outlying districts many of the severe but non-fatal cases were ambulatory even during the acute stage of the disease in spite of warnings to the contrary and had returned to their normal pursuits within ten days of the onset.

108. In the eleven fatal cases the average duration was four and a half days, the shortest being two days in the case of a European and the longest seven days in a young adult African.

#### G.—DIAGNOSIS.

109. The diagnosis of cases in the early stages was by no means simple.

110. The chief points to be relied upon were as follows:—

Sudden onset, severe headache, early prostration, rapidly increasing albuminuria and a tendency to the occurrence of a relatively slow pulse as compared with the temperature. Later, jaundice in many, vomiting and hæmorrhages completed the picture.

111. Such diseases as relapsing fever, Weil's disease, malaria, blackwater, paratyphoid and dengue had to be eliminated.

#### H.—PROGNOSIS.

112. While patients suffering from delirium, and intense jaundice and heavy albuminuria recovered, those who suffered from black vomiting and anuria invariably died.

113. The case mortality was as follows:—

Total:—eleven out of sixteen or 68.7 per centum.

Europeans:—three out of three or 100 per centum.

Syrians:—four out of four or 100 per centum.

Africans:—four out of nine or 44 per centum.

#### I.—TREATMENT.

114. Rest, alkaline draughts and a very light diet formed the basis of treatment which was largely symptomatic. The exhibition of organic arsenical preparations intravenously was tried but without success. Noguchi's serum was not exhibited owing to the serious doubt that exists as to the West African type of yellow fever being due to the *Leptospira icteroides*.

#### J.—ADMINISTRATIVE PROVISIONS AND PREVENTIVE MEASURES.

115. The following legal provisions were of value in combating the outbreak.

116. 1 *Legal Measures*.—(a) Chapter 16, Laws of the Colony. Under section 139, summary action can be taken against any persons placing or permitting to be placed tins, bottles, rubbish, etc., other than in the places set aside by the Health Authorities.

117. Prosecutions under the section referred to above during the period 1st April—30th June, numbered 474 and fines amounted to £302 19s. 0d.

118. (b) Chapter 61, Law of the Colony. This, *inter alia*, makes compulsory the reporting of cases of yellow fever and empowers Health Authorities to isolate suspected and actual cases and contacts of infectious disease, to fumigate premises, to evacuate persons from an infected area, etc. In addition, Regulation No. 12 of 1921 comes into force immediately a place is declared infected under this Ordinance and this gives the Health Authorities wider powers, for example, the right to enter premises between 6 p.m. and 6 a.m., to examine intending passengers by land or sea, to prevent the holding of funeral customs, public meetings, etc.

119. Under this Ordinance an Order (No. 12 of 1927) by the Governor dated the 25th of April, 1927, declared the town of Accra an infected area.

120. This order was subsequently revoked by Order by the Governor No. 18 of 1927, dated the 20th of May, but a similar one was re-enacted at the time together with an order for the evacuation by Europeans and Syrians, between 5 p.m. and 6 a.m., of almost the entire African township.

121. After an interval of eighteen days from the screening of the last case in the outbreak under review, the order referred to above was revoked by Order by the Governor No. 20 of 1927, dated the 14th of June, 1927.

122. (c) Chapter 63, Laws of the Colony. This Ordinance provides for the placing in quarantine of ports where one or other of the more fatal epidemic diseases, e.g., yellow fever, has broken out. Ships and passengers from such ports can be examined and the latter can be kept under observation or under surveillance, thus minimising the danger of importation of infectious diseases.

123. Order by the Governor No. 11 of 1927, declared the port of Accra an infected place on the 22nd of April, 1927, and the port was declared free by Order by the Governor No. 21 of 1927, dated the 14th of June, 1927.

124. (d) Chapter 64, Laws of the Colony. This Ordinance is particularly applicable in the case of outbreaks of yellow fever since appropriate action can be taken to prevent persons allowing stagnant water on premises and to compel the screening against mosquitos of tanks and wells, etc.

125. Large numbers of notices were served under the Ordinance for persons to protect tanks, wells, etc., and prosecutions and fines between the 1st of April and the 30th of June, 1927, numbered 353 and £336 5s. 0d., respectively.

126. The Police Magistrate was asked to increase the fines so as to reduce the number of careless persons allowing the *Aedes argenteus* to breed on their premises.

127. This measure, combined with a very rigid domiciliary inspection, resulted in a fall of the larval index from over eight in the second week in May, to two a month later.

128. (e) Chapter 65, Laws of the Colony. This Ordinance is partly concerned with the general sanitation of a town; and its provisions with regard to nuisances in particular are of direct value in preventing insanitary conditions which may react on the general health of townspeople and may give rise to the breeding of the presumed vector of yellow fever.

129. Prosecutions under this Ordinance during the period 1st April—30th June, 1927, numbered 19.

130. (f) Ordinance No. 26 of 1925, which came into force on the 1st of June, 1926, also served as a means of combating the epidemic, since, under its provisions, no one can be buried unless a permit is obtained from the Medical Officer of Health who also acts as Registrar of Births and Deaths.

131. In this way, persons who died unattended by a qualified medical practitioner could be examined before burial by the Health Authorities thus reducing the possibility of missed cases.

132. (g) Application of provisions of Chapters 61, 64 and 65, Laws of the Colony, to other areas in the Gold Coast.



133. In order to be in a position to deal effectively with outbreaks of yellow fever in other areas in the Gold Coast and at the same time to prevent the introduction of cases into Accra as far as possible, towns where the disease broke out were declared infected and in some cases were surrounded by police posts, persons not being allowed to leave without permits.

134. Such restrictive measures were relaxed as soon as the conditions in the town in question warranted.

135. During the period covered by this report the following towns were declared infected:—Late, about 36 miles by road north-east of Accra, and Sra-Somanya, about 45 miles by road north-east of Accra. Early in July, Kpeve about 105 miles by road north-east of Accra was declared infected owing to an outbreak which is believed to have commenced towards the end of May although it was not discovered until two cases occurred in Europeans in the middle of June.

136. Endeavours were made to reduce the breeding of mosquitos and other insanitary conditions prevailing in the towns in question as rapidly as possible.

137. II. *Isolation of Patients and Contacts.*—The Resident Medical Officer of the Gold Coast Hospital kindly agreed to treat all Syrian and African cases there while the Medical Specialist treated the three European cases in the Hospital.

138. Unfortunately, both from the point of view of treatment and from the epidemiological standpoint, the majority of the Syrian and African cases were not discovered and screened until after the fourth day of the disease by which time they had, of course, ceased to be infective.

139. Owing to the unreliability of histories, however, it was always considered advisable to screen the patients.

140. Contacts were kept under surveillance for six days in their houses after the latter had been Claytonised or else at the Contagious Diseases Hospital, isolation in the Contagious Diseases Hospital being considered desirable.

141. One contact—the steward boy who had acted as servant in the household from which two of the three fatal European cases were removed—developed the disease but was presumably infected from the same source as his mistress.

142. III. *Evacuation of so-called “non-immunes” from the African township.* Previous epidemics of yellow fever in West Africa had been largely confined to non-Africans.

143. The epidemic at Asamankese in May-September, 1926, proved this hypothesis to be erroneous.

144. On the other hand, in this and subsequent epidemics, evidence was forthcoming to the effect that, although the African could not be classed as the “immune,” the case mortality rate was very much smaller than the same rate in Europeans and Syrians.

145. For this reason attempts were made to persuade Europeans to reside in the European residential areas rather than in the African township.

146. Many gave effect to this advice but several did not for one reason or another.

147. The Health Authorities, therefore, asked for an evacuation order and this was signed on the 20th of May, 1927.

148. Up to the date of the order three European and three Syrian cases, all fatal, had occurred out of a total of nine cases.

149. Subsequent to the carrying out of the order, no European cases occurred. One Syrian case was discovered having delayed obeying the order and having, thus, contracted yellow fever, and six African cases were reported.

150. Accommodation for two hundred and six Europeans and one hundred and fifty-six Syrian—exclusive of children—was found outside the African township.

151. Europeans were housed in bungalows lent by His Excellency the Governor, the Officer-in-Charge of Government Quarters, the Manager the Gold Coast Railways, and the Principal of Achimota and also in partly completed dormitories at Achimota, in the Rest-house, in tents and in the bungalows of friends. Syrians were housed in the old Native Hospital and in huts at the Contagious Diseases Hospital until they could find accommodation in newly constructed houses on the outskirts of Adabraka and Labadi, two suburbs of Accra.

152. The compulsory evacuation order lasted from 20th of May, until the 14th of June, when the order was revoked.

153. All who could obtain bungalows in the European residential area were strongly advised to do so instead of returning to the African township.

154. In order to preserve the essential character of the European residential area as far as possible a copy of the rules for residents—more particularly that prohibiting the presence of African children in the area at any time and of boys' wives after dusk—was circulated to all residents.

155. The majority obeyed these rules loyally but a few did not fulfil their obligations to their neighbours and the Health Authorities had to elicit the help of His Excellency who had a special circular despatched to all residents in the residential area in Accra.

156. Europeans compelled to work in the African township during the day were advised to wear mosquito boots.

157. IV. *Curtailment of Public Meetings.*—In order to minimise infection of individuals as much as possible, all public functions were curtailed and efforts made to see that all dispersed before night-fall.

158. Thus, the Empire display by the schools was held on the outskirts instead of on the race course in the middle of the residential area.

159. Sir James Crawford Maxwell, the retiring Governor, gave up the official gathering on the beach to witness his departure for the same reason.

160. The pastors in charge of churches kindly agreed to hold their evening services in the afternoons.

161. The cinemas, especially as both were in close proximity to infected premises, were closed for the time being.

162. Dance-halls and bars were similarly treated.

163. The Ga Mantse and Mantsemei were asked to forego such native customs as were attended by the gathering together of numbers of individuals e.g. funeral customs.

164. Schools were not closed as it was thought that the possibility of infection was much less than if the children had been allowed to remain in their own homes.

165. Moreover, a check could be kept on absentees from school on account of fever or other illness.

166. V. *Examination of Passengers by Sea.*—In order to protect shipping and other ports from infection by sea, and, incidentally, the re-infection of Accra from such sources, all intending passengers from Accra were medically inspected prior to being allowed to embark. Similarly, passengers disembarking from ships which had called at ports where yellow fever existed, were medically inspected in the quarantine station immediately after disembarking.

167. The following ports in addition to Accra were placed in quarantine on account of outbreaks of yellow fever during the period 1st April—30th June:—Lome, Porto Novo.

168. Persons suspected to be suffering from fever were isolated in both cases and passengers from ports where yellow fever existed were kept under observation for six days.

169. Shipping was required to anchor not closer than 1,000 yards from the shore and, apart from *bona fide* passengers, only officers of Customs, Police or Lighterage firms were allowed to board during the period in which Accra was in quarantine.

170. VI. *Conference.*—At the request of the Health Authorities various bodies conferred with a view to assisting in stamping out the outbreak.

171. For example, a meeting was held on the 10th of May with private medical practitioners. This meeting was attended by Drs. F. M. Simmonds, F. V. Nanka-Bruce, C. E. Reindorf, F. Ribeiro, J. H. Murrell, and T. Mensa-Annan, all local African and West Indian practitioners, who were asked to co-operate with the Health Authorities by reporting any cases of fever with jaundice and/or albuminuria encountered among their patients.



172. Valuable information was obtained from one practitioner which lead to the discovery of the epidemic at Late.

173. Again, on the 20th of May, after various meetings with the President, a meeting was arranged with the Chamber of Commerce and the situation was explained to the Chamber.

174. The co-operation of the members was sought both as regards providing accommodation in the European residential area for Europeans normally resident in the African township and as regards volunteers for domiciliary visits of inspection to eradicate mosquito breeding in domestic water supplies and to encourage the inhabitants to improve their standard of sanitation.

175. Conferences were also held with the leaders of the Legion of Frontiersmen who volunteered for any duty in connection with the epidemic and who acted as European Sanitary Inspectors with excellent results.

176. A conference was held on the 3rd of June, attended by the Medical and Surgical Specialists, the Director and Pathologist of the Medical Research Institute, the head of the Rockefeller Yellow Fever Commission on the Gold Coast and the Health Authorities.

177. The object of this meeting was to exchange views with regard to the cardinal signs and symptoms and pathological findings necessary before a definite diagnosis of yellow fever could be made and to elicit recommendations as to what other means could be employed in dealing with the epidemic.

178. VII. *Uncertified Deaths*.—A small proportion—15.6 per centum of all deaths registered during the period April—June, 1927—of deaths occurred in persons who had not been attended by qualified medical practitioners and in such cases the bodies of the deceased were examined and, if yellow fever or other infectious disease was suspected, dissections were carried out as an obvious safeguard against the burial of "missed" cases of yellow fever.

179. VIII. *General Sanitary Measures*.—The routine procedure following upon the discovery of a case of yellow fever included the isolation under a net of the patient, the removal of immediate contacts to the Contagious Diseases Hospital, where they were examined twice daily, the daily surveillance of indirect contacts, the Claytonisation of infected premises and premises within the radius of a gradually widening circle of the original focus, intensive anti-larval measures in the infected area and in the town as a whole, frequent house-to-house inspections for possible patients and for the abatement of nuisances and insanitary conditions likely to affect the general health and comfort of the community, including the draining and filling in of pools, ponds, swamps, marshes, etc.

180. In connection with these activities, it should be recorded that excellent work was carried out by volunteers from the Chambers of Commerce, the Legion of Frontiersmen and by the school children. European members of the first two groups acted as Sanitary Inspectors and carried out many domiciliary visits thus helping to reduce the larval index from over eight in the middle of May to about two a month later besides encouraging householders to improve the hygienic conditions of their rooms and compounds.

181. A "Health Day" was held on the 13th of May and again on 13th of June and, with the helpful co-operation of the Education Authorities, the school children were organised into small groups and helped householders to remove large quantities of refuse and numbers of useless tins and bottles to the public dustbins.

182. Normally, thirty tons of refuse are removed by seven lorries from the public dustbins to the dump per diem.

183. On the "Health Day" in June eighteen lorries carried 127 tons to the dump—a satisfactory clear up.

184. IX. *Immunization by Administration of Vaccine*.—This measure has been placed last purposely although it may appear to be inconsistent with the fact that the writer was originally responsible for obtaining Noguchi's anti-yellow fever vaccine in the epidemic of 1922-23.

185. A great deal of research work has been carried out by officers of the Government service and of the Rockefeller Yellow Fever Commission since that date, but the *Leptospira icteroides* described by Noguchi as the causal organism of the outbreaks in America has never been isolated in the Gold Coast. It is, therefore, possible that the West African type of yellow fever is due to some other organism.

186. In the absence of positive grounds for this hypothesis, however, it would be very unwise to dispense with any therapeutic measure in view of the high case mortality rate.

187. For this reason all Europeans were circularised and offered free inoculation with Noguchi's vaccine.

Many took advantage of this offer which, no doubt, had a useful psychological effect even if the vaccine confers little or no immunity against infection.

#### E. RECOMMENDATIONS :—

188. (a) *Segregation of Syrians.*—From the foregoing it will be observed that the first and last cases of yellow fever in the outbreak under review were of Syrian nationality, that twenty-five per centum of all cases were of the same race and that the case mortality was one-hundred per centum.

189. This is not an isolated instance, for past history and experience has shown that the members of the Syrian community on the Gold Coast are proportionately the worst sufferers from yellow and haemoglobinuric fevers.

190. They live under most unsatisfactory conditions for the most part and they are a real danger to the community as a whole as well as to themselves.

191. The partial or complete segregation of Syrians in residential areas is a practical possibility and, as far as Accra is concerned, land owned by Government is available at Adabraka.

192. Recommended :—that compulsory segregation of Syrians in satisfactory areas be adopted in Accra and the larger towns on the Gold Coast.

#### (b) *Relief of Congested Areas.*

193. Reference to the map submitted with this report will demonstrate the point that the cases of yellow fever occurred in the immediate vicinity of the same congested area in which many deaths from smallpox took place in the epidemic of 1920.

194. The Asere quarter forms a part of the congested area in question. The Aseres are quite willing to move to their ancestral lands at the north west extremity of Korli Lagoon. The land there is suitable for building purposes and could be laid out without difficulty.

195. The remainder of the area bounded by Horse Road on the north, by the High Street on the south, and by Zion Street and Bannerman Road on the west, could no doubt be dealt with by moving the majority of the occupants of the insanitary hovels on to the land between the Nsawam Road and Boundary Road south of Adabraka.

196. Recommended :—That Kaneshie and the south Adabraka areas be laid out by Government, that suitable types of houses be built on both sites, that the delapidated and insanitary hovels in the congested area be demolished and the area relaid out, that Government recoups itself for the heavy capital expenditure involved by deducting the cost of the lay-out of the areas and the construction of houses from the compensation to be paid for houses demolished or by collecting rents for the houses occupied in the new areas.

197. In this connection it is noteworthy that over £1,380 was recovered in rents in 1926-27 from the occupants of thirty-six compound houses constructed by Government in 1924-25 as part of the new Zongo at Kumasi to replace the plague-ridden one.

198. (c) *Draining of Korli Marshes.*—There can be no doubt but that a proportion of the ill-health of the town of Accra results from the presence of marshes chiefly along the eastern margins of the lagoon from the bund on the south to Agboghloshie, Adabraka and Kokomlemle to the north. These marshes, it must be remembered, are to the windward of the town and result in veritable plagues of mosquitos from time to time.

199. Apart from taking the surface water from the greater portion of the drains of Accra, the lagoon acts as a catchment area for many square miles of country as far inland as the foot hills of the Aburi Ridge.



200. There can, thus, be no question of the lagoon being completely filled in, nor is this essential from the health standpoint.

201. On the other hand the filling of the low-lying marsh, particularly between the bund and the causeway on the south and between the north end of Riponsville Cemetery and Railway Ridge further north, would result in a very great reduction in the mosquito menace and in the making of land which, once consolidated, would be of considerable commercial value.

202. Much work on a small scale, for example the construction of herring-bone channels and the clearing of weed and oiling, has been done from time to time but this method is both costly and temporary in nature.

203. (d) *Restrictions on Quarrying.* A somewhat lesser source of supply of mosquitos in Accra is afforded by the numerous quarries that have been worked inside the town and by the existence of low-lying areas in the immediate vicinity of houses, for example in Orgle Street, along Cromer road and on both sides of Derby Avenue. The second group of areas are small and are capable of easy filling.

204. The question of quarrying is a larger one, but demands attention for not only are large areas of building land spoilt or destroyed but each quarry serves as a nursery for mosquitos.

205. *Recommendations:*—That quarrying in the town of Accra be restricted to two or three well-defined areas where the question of the destruction of building land does not arise.

206. That the practice of digging numerous pits be discontinued and that quarries be worked on a system of graded cuts. That the low-lying areas in the centre of the town be filled to above the level of neighbouring road drains.

207. That steps be taken to connect up the existing terminations of the concrete drains opening into the east bank of the lagoon from the bund on the south to close to Agboghloshie on the north by means of a steened retaining wall.

208. Later, a second retaining wall might be constructed along a portion of the west bank of the lagoon.

209. That the area between this wall and the town be filled to a depth of about three feet. The sand on the south and the material in the Harbour Works quarries to the north would serve as sources of material.

210. That the bed of the lagoon in its central portion be deepened and that the arms of the lagoon extending northwards to Adabraka, Kokomlemle and Kaneshie, Yellowah etc., be canalized.

211. That a pump be installed on the bund, to the south to keep the level of the lagoon down thus assisting the two concrete channels under the road on the bund since these channels cannot be kept open owing to the very considerable power of the surf.

212. That the Government recoup itself for the very considerable expenditure entailed by dealing with this lagoon—estimated at between £10,000 and £50,000—by renting or selling the land reclaimed to commercial interests.

213. (e) *Improvement in System of Refuse Disposal.*—Connected indirectly with the foregoing is the question of refuse disposal in Accra.

214. Apart from the fact that the number of public dustbins is inadequate for the needs of the population, a lack which results in refuse being deposited on open spaces, the ultimate disposal of rubbish into quarries and into the southern portion of Korli lagoon along the bund leaves much to be desired.

215. There can be no doubt whatsoever that a town of the size of Accra with a population of over 50,000 requires an efficient destructor, say of three or four cells. Providing care was taken that the type of destructor was one consuming its own smoke, a suitable site could be found for it in the neighbourhood, say, of the building-free zone resulting from the presence of the large expanse covered by Riponsville Cemetery.

216. Incombustible refuse could be taken by mono-rail north or south along the side of the existing railway track and dumped in the marshy area on the east side of the lagoon.

217. In this way the fly nuisance would be almost entirely obviated, material



would be at hand for use in filling the swamp and it is possible that the running costs could be reduced by means of public utility scheme, e.g., public laundry, clinker for roads etc., worked in conjunction with the destructor.

218. *Recommendation*:—That a three or four celled destructor similar to those made by the New Destructor Company of Pershore—used at Colombo and in other parts of tropics—be obtained for Accra.

219. (f) *Introduction of Water-Carriage Sewage System*. Apart from a lack of dustbins the Accra municipality is not well equipped with latrines. A water-carriage system of night-soil disposal has been a pressing matter for many years but has been postponed, hitherto, on financial grounds.

220. The water-borne sewage system for the Gold Coast Hospital and staff bungalows has been quite satisfactory. With a large scheme for the whole town it would be necessary, however, for the sewage to be discharged into the sea, Shone ejectors being used in certain low-lying areas.

221. *Recommendation*:—That pending the preparation of a scheme for water-carriage sewage which should be proceeded with as soon as possible, such additional latrines as the Medical Officer of Health may deem absolutely essential should be constructed in such portions of the town as lack such conveniences with undesirable consequences at present.

222. (g) *Provision of Improved Water Supply*.—Arising out of the above recommendation and for a reason especially associated with the prevention of epidemics of yellow fever is the question of improvements in the water supply.

223. Under existing conditions whereby the water supply for parts of the town is under such low pressure that water can only be obtained intermittently or with difficulty and where it is liable to be cut off without warning, there is a quite reasonable custom of the inhabitants of the area to store water in large containers. Further, there is a general inclination on the part of the townspeople to retain the use of tanks, cisterns, wells etc., all of which it is almost impossible to keep mosquito proof.

224. It is noteworthy that ineffectively protected tanks were found in or in the immediate vicinity of several of the premises where cases of yellow fever occurred.

225. The hands of the Health Authorities are, consequently, tied to a large extent. While the most satisfactory method of eliminating the menace of the badly protected tank or well would be to dismantle the former and to permanently seal or fill in the latter, considerations arise of the hardship and danger to health resulting from lack of water due to the closing of one or more public standpipes.

226. *Recommendations*:—That a reservoir to hold, say, one million gallons be constructed on contours 170-180 on Government land situated in the vicinity of the water tower at mile 3 on the Dodowa road.

227. The danger to health arising from bursts in the main from the waterworks station at Weija to Accra will be considerably minimised if this recommendation or one on similar lines is adopted.

228. (h) *Segregation of Europeans in Residential Areas*.—The history of the epidemic both as regards Syrians and as regards Europeans is but a repetition of that of previous outbreaks.

229. In this instance the seven cases, all fatal, that were reported in Europeans and Syrians occurred in persons living in the African township and not, in the case of the Europeans, in the residential area reserved for Whites.

230. Two of the three Europeans who died were actually advised in person on the 7th of May to leave the infected area, but did not heed the advice, fell sick on the 16th of May and died on the 20th and 21st of May.

231. In the last serious outbreak in the Gold Coast in 1922-23, all of the ten fatal cases in Europeans lived in the African townships and not in European residential areas.

232. In view of the very considerably increased danger of acquiring yellow fever, malaria and a variety of other diseases resulting from persons of white race living in African areas, apart altogether from the question of being surrounded by the sounds and smells incidental to normal native life, there can be no question as to the value of residing in special residential areas.



233. If the tragedies of the past are to be avoided in future, vigorous propaganda and possibly legislative measures will be required to induce commercial interests to ensure that their employees live in areas set apart for Whites.

234. In Accra, as in almost every large centre in the Gold Coast, ample land is available on which to build bungalows and in some cases firms have actually been in possession of such land for many years, but have so far failed to utilise it.

235. *Recommendation*:—That commercial interests on the Gold Coast be circularised by Government—action has already been taken by the Health Authorities but with only partial success—and advised to obtain land in areas reserved for Whites and to provide suitable quarters for their white employees in such areas.

236. If this form of propaganda fails and all other avenues of approach have been explored without result, the question of compulsory segregation of Whites living in the worst areas in the African town or in the African town as a whole, should be entertained.

237. (i) *Enforcement of Rules for Residential Areas*:—An important factor in connection with the previous recommendation is the question of the maintenance of residential areas for Whites as such. Rules exist for these areas prohibiting the presence of African children at any time and of African servants' wives at night.

These rules are loyally obeyed by many and are broken by a few.

238. It is the custom to issue circulars from time to time and two were issued during the epidemic in Accra, the first by the Health Authorities which was not generally obeyed and the second at the request of the Health Authorities by His Excellency's direction.

239. *Recommendation*:—That residents be reminded periodically by Government of the duty they owe to the community with regard to the loyal adherence to the rules relating to residential areas and that disciplinary action follow disobedience to such rules after written warning had been given.

240. (j) *Increase in Sanitary Staff*:—An adequate sanitary personnel is essential if the community is to be properly protected from devastating epidemics of preventable diseases.

241. The worst epidemic of yellow fever that has ever been recorded in West Africa was in progress for at least two months in the middle of 1926, at a town within fifty miles of Accra, as the crow flies, before it was discovered.

242. With adequate sanitary staff such a dangerous state of affairs could never have arisen.

243. The number of new foci of the disease established by the long delayed discovery of the epidemic in question cannot be computed and the possibility of the lesser epidemics which have been discovered this year—including the one under review—having originated in the serious outbreak last year cannot be ignored.

244. With the advance in education and with the attendant growth in popularity of "Whiteman's Medicine" replacing to some extent fetish and native medicine—the sudden and apparently miraculous curing of framboesic and syphilitic lesions by organic arsenical compounds no doubt influenced this accession of popularity—the clinical work of a Medical Officer in a busy district has increased to such an extent that it is a physical impossibility for many officers to act as Health Officers in their districts and to supervise purely preventive work.

245. For this reason an increase in the sanitary staff is an urgent need and if funds are available it is, in the writer's opinion, a question of international duty apart altogether from local considerations that the staff should be adequate to prevent and to combat outbreaks of infectious diseases.

246. Considerable value would accrue from having a mobile unit consisting of a Health Officer, a Disinfector Mechanic and a specially trained Sanitary Inspector capable of vaccinating. The unit would be equipped with two portable motor Claytons, tarpaulins, disinfectants, camping outfits, laboratory material, etc.

247. This unit with four trained boys and a police constable could be stationed at headquarters and would be available at a moment's notice to proceed to any place from which the presence of an infectious disease had been reported.



248. As a general rule valuable time is lost at present before investigations and appropriate measures can be taken with the inevitable result that dissemination of the disease and deaths occur.

249. *Recommendations*:—That sanction be obtained for an immediate increase in the sanitary staff by two Medical Officers of Health and that sanction be obtained from the Secretary of State for the inclusion in the Estimates for 1928-29 of a further ten Medical Officers of Health, sixteen Superintending Sanitary Inspectors, six 2nd Division Sanitary Inspectors and six Assistant Disinfectors Mechanics.

250. (k) *Amendment in the Law for Burial of Dead Persons*.—According to the present interpretation of Section 34 of Ordinance No. 26 of 1925, Laws of the Colony, registrars are under a legal duty to issue permits for the burial of bodies of deceased persons unless they have reasonable cause to believe that the deceased died an unnatural death or owing to the negligent or criminal conduct of himself or of others.

251. Cases where infectious disease is suspected can be dealt with under section 6 of Chapter 61, Laws of the Colony.

252. The effect of the present law, therefore, is that bodies found dead in the street or of persons dying suddenly in their houses not having received any medical attention have to be buried without reference to the Coroner unless the Registrar of deaths has reasonable cause to believe that foul play or neglect has been the cause of death or unless he has reason to suspect infectious disease.

253. In many cases no friends or relatives are forthcoming to offer any information about the diseased or, if available, their information may be entirely unreliable.

254. In other cases no history of any symptoms suggestive of infectious disease may be obtained and no outward signs exist to guide one in such a diagnosis.

255. The danger of undetected crime and of undetected infectious disease is, therefore, manifest apart altogether from it being contrary to the laws of civilization to bury persons like dogs.

256. *Recommendations*:—That the law for the issue of burial permits be amended to empower registrars to refer deaths to the Coroner for investigation and, if necessary, for dissection of the body by a qualified medical practitioner in such case where, while having no positive evidence of criminal conduct or neglect or of infectious disease, the possibility of such cannot be excluded except through the medium of an autopsy.

257. (l) *Experimental work to prove Organism and Vector*.—In spite of the long and arduous investigations which have been carried out by the members of the Rockefeller Yellow Fever Commission up to the time of writing no organism has been isolated from cases even when these have been watched daily from within an hour or two of the onset. Noguchi's *Leptospira icteroides* has never been found in West Africa.

258. \*Further, although there is a considerable amount of negative evidence that the *Aedes argenteus* is the vector no proof of this has been forthcoming.

259. It is very desirable both for the sake of patients and in order to control the disease satisfactorily that either a method of discovering the causal organism should be found, or a specific bio-chemical reaction should be developed to allow of a rapid diagnosis being made. Secondly, in order that preventive measures shall possess scientific basis and that efforts directed against the disease shall not be wasted, it is very important that the hypothesis of the transmission of the virus by the *Aedes argenteus* should be proved.

260. This would involve human experiments and it is suggested that the matter is so important to the safety and welfare of the inhabitants of the Colony as a whole that steps should be taken to obtain authority for such experiments using condemned prisoners as volunteers.

261. \*In conclusion, I have the honour to bring the names of the following gentlemen to your notice for their devotion to duty during the epidemic in Accra:—

Dr. R. D. Reid, Medical Officer of Health, from the 21st May.

Mr. P. P. Horn, Superintending Sanitary Inspector.

Mr. J. C. Barnor, Chief Clerk.

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\*Since the compilation of this report conclusive transmission experiments have been carried out, using *Aedes argenteus* as a vector, by members of the Rockefeller Yellow Fever Commission.



Mr. A. Q. Thompson, Senior Sanitary Inspector.  
 Mr. J. E. Quaison, 2nd Division Sanitary Inspector.  
 Mr. E. H. Nortey, 2nd Division Sanitary Inspector.  
 Mr. G. A. Badu, 2nd Division Sanitary Inspector.

262. In addition, I should like to place on record my indebtedness for their kindly help and co-operation to the following:—

T. D. Cranston Esquire, Education Department.  
 Reverend A. G. Fraser, Principal, Achimota.  
 L. M. Grover Esquire, Public Work Department.  
 The Reverend T. Kingsley Williams, Acting Principal, Achimota.  
 Dr. C. V. Le Fanu, Medical Department.  
 A. G. Macpherson Esquire, Public Works Department.  
 Dr. A. F. Mahaffy, Rockefeller Yellow Fever Commission.  
 Captain N. S. Mansergh, Police Department.  
 Dr. A. J. R. O'Brien, Medical Department.  
 Captain J. R. W. Reid, Officer Commanding, Legion of Frontiersmen.  
 Captain A. T. J. Thomas, Quartermaster, Legion of Frontiersmen.  
 Captain S. C. Seward, Survey Department.  
 Captain L. S. D. H. Venour, Police Department.  
 The Reverend H. Webster, Wesleyan Mission.  
 Dr. A. Wilkie, Presbyterian Mission.

P. S. SELWYN-CLARKE, M.D., M.R.C.P.

*Acting Deputy Director of Sanitary Services.*

No. 2363. M.P. 7146/1927.

COLONIAL SECRETARY'S OFFICE,

ACCRA, GOLD COAST,

31st May, 1927.

STRICT COMPLIANCE WITH THE "RULES FOR RESIDENTS IN  
RESIDENTIAL AREAS OF THE GOLD COAST" BY OCCUPIERS  
OF GOVERNMENT BUNGALOWS IN ACCRA.

I am directed by the Acting Governor to refer to a circular dated 9th May, 1927, which was issued by the Acting Deputy Director of Sanitary Services to occupiers of Government bungalows in the Accra Residential Area, in which attention was drawn to the importance of strict compliance with Rule 1 of the "Rules for Residents" during the present Yellow Fever epidemic.

2. His Excellency learns with regret that, in a small proportion of cases, occupiers have failed to comply with the Rule in question.

3. The Sanitary Authorities point out that fifteen cases of Yellow Fever, with eight deaths, have occurred in Accra during less than two months, and that three European residents in the Commercial Area of the town have fallen victims to the disease. They also impress the point that African children are not only proved carriers of the most easily transmitted form of malignant tertian but also are believed on good grounds to act as reservoirs for the virus of Yellow Fever. His Excellency therefore, trusts that officers will co-operate in every way possible with the Sanitary Authorities in the efforts they are making to prevent the spread of the epidemic to the Residential Area. Accordingly, I am to convey His Excellency's request that officers will adhere strictly to Rule 1 of the Rules for Residents which reads as follows :—

"Occupiers are responsible for the sanitary condition of their respective houses, yards and servants' quarters. Servants' wives must not sleep in the area and no native children are allowed in any part of it."

4. His Excellency is also informed that in five compounds of Government Officers within a few days mosquito larvae have been found breeding in tins under ice-chests and meat-safes, and in flower vases, tubs and tins. Officers are therefore, earnestly requested to make a careful inspection of their houses, compounds and boys' houses at least once weekly to obviate the possibility of breeding of the mosquito carrier of Yellow Fever.

5. His Excellency directs me to say that disciplinary action will be taken if, after warning, any mosquito larvae are found in bungalows and compounds of Officers, or any Officers neglect to comply with Rule 1 quoted above. For this purpose, the Acting Director of Sanitary Services has been instructed to report to Heads of Departments the names of Officers who transgress in these respects.

6. Spare copies of this circular are attached, and I am to request you to hand a copy to each Officer of your Department who occupies a Government bungalow in Accra.

G. C. du BOULAY,

*Acting Colonial Secretary.*



TABLE V.

DEATHS AT ALL AGES IN ACCRA FOR THE CALENDAR YEARS  
1923-1927, INCLUSIVE.

			1923.	1924.	1925.	1927.	1927.	Monthly Averages.
January	..	..	83	82	98	140	92	99.0
February	..	..	65	64	74	95	74	74.4
March	..	..	82	77	84	113	90	89.2
April	..	..	74	47	88	111	101	84.2
May	..	..	89	84	80	99	114	93.2
June	..	..	93	87	89	115	105	97.8
July	..	..	118	92	102	132	115	111.8
August	..	..	110	105	137	111	119	116.4
September	..	..	83	60	116	74	91	84.8
October	..	..	65	91	90	71	77	78.8
November	..	..	78	71	83	75	81	77.6
December	..	..	85	93	74	86	98	87.2
Totals	..		1,025	953	1,115	1,222	1,157	—

TABLE VI.

LIST OF AREAS WHERE OUTBREAKS OF YELLOW FEVER OCCURRED  
IN THE GOLD COAST DURING THE YEAR, 1927.

Town.	CASES			DEATHS.		
	European.	African.	Syrian.	European.	African.	Syrian.
Accra ..	4	9	4	4	4	4
Agate ..	—	1	—	—	1	—
Agomeda ..	—	1	—	—	—	—
Akuse ..	—	1	—	—	—	—
Akwamu ..	—	1	—	—	—	—
Bame ..	—	6	—	—	1	—
Cape Coast ..	2	—	1	1	—	1
Elmina ..	1	—	—	1	—	—
Gbefi ..	—	1	—	—	1	—
Ho ..	1	2	—	—	—	—
Koforidua ..	—	1	—	—	1	—
Kpando ..	—	2	—	—	2	—
Kpeve ..	2	4	—	—	1	—
Late ..	—	32	—	—	4	—
Nsawam ..	—	2	—	—	1	—
Obuasi ..	2	—	—	2	—	—
Somanya ..	2	1	—	2	1	—
Sra ..	—	4	—	—	3	—
Suhum ..	—	20	—	—	5	—
Totals ..	14	88	5	10	25	5



# THE GOLD COAST

